

**THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MASSACHUSETTS**

DePuy Mitek, Inc.)	
a Massachusetts Corporation)	
)	
Plaintiff,)	
)	
v.)	Civil No. 04-12457 PBS
)	
Arthrex, Inc.)	
a Delaware Corporation and)	
)	
Pearsalls Ltd.)	
a Private Limitd Company)	
of the United Kingdom)	
)	
Defendants.)	

**DePuy Mitek's Memorandum in Opposition to
Arthrex's Motion for Summary Judgment**

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I. Introduction

DePuy Mitek, Inc. (“Mitek”) opposes Arthrex, Inc.’ and Pearsalls Ltd.’s¹ motion for summary judgment of noninfringement and invalidity because Arthrex has not shown that it is entitled to judgment as a matter of law and because, at the very least, there are genuine issues of material fact precluding summary judgment.

Arthrex bases its request for summary judgment of noninfringement on the arguments that the ultra high molecular weight PE used in its FiberWire construction is not a “first fiber-forming material” as defined in the 446 Patent claims or, alternatively, because the silicone coating on FiberWire allegedly has a material effect on the basic and novel characteristics of the suture, so that the suture is excluded from the claim scope by the “consisting essentially of” transitional language. Arthrex’s motion is predicated on the court’s adopting its construction of the claim term “PE” and “consisting essentially of;” if the Court adopts Mitek’s construction, Arthrex’s arguments are moot. In any event, as explained below, Arthrex has not met its burden of coming forward with indisputable evidence that would entitle it to judgment as a matter of law on either of these issues. At the very least, there are genuine issues of material fact precluding summary judgment, such as what a “general purpose PE” is, what the “function” of the claimed first fiber-forming materials is, whether any differences between ultra high molecular weight PE and the recited first fiber-forming materials are substantial, what the “basic and novel” properties of the claimed sutures are, and what constitutes a “material” effect on those properties. The evidence provided by Mitek with this Opposition shows that a reasonable juror could find for Mitek on each of these factual issues.

¹ Arthrex & Pearsalls jointly submitted their motion. For simplicity, Mitek refers to them jointly as Arthrex. Also, any distinctions between Arthrex’s FibeWire and TigerWire products are not relevant here, and Mitek refers to them jointly as “FiberWire” here.

Arthrex also moves for summary judgment that the asserted claims of the 446 Patent are invalid, on the basis that they are allegedly anticipated by the disclosure of the 575 Patent. The weakness of Arthrex's anticipation argument is underscored by the fact that it is predicated on a representation of what the 575 Patent discloses that is directly contrary to what Arthrex's counsel told the Patent Office, when Arthrex was trying to get its own patent. Arthrex has not come forward with indisputable evidence that would entitle it to judgment as a matter of law that the 446 Patent claims are anticipated. At the very least, there are genuine issues of material fact precluding summary judgment, such as what the 575 Patent discloses and whether it even qualifies as prior art against the 446 Patent.

Arthrex begins its brief with irrelevant and incorrect assertions about Mitek, the development of FiberWire, and the development of the claimed invention. Since those allegations are irrelevant to this motion, and Mitek lacks the pages to address them, it will not do so in this opposition. Arthrex's incorrect factual assertions are addressed in Mitek's Responsive Statement of Facts.

II. Arthrex Has Not Met Its Burden of Showing It Is Entitled to Summary Judgment of Noninfringement

A. Law of Infringement and Summary Judgment

The infringement analysis requires two steps. *Markman v. Westview Ints., Inc.*, 52 F.3d 967, 976 (Fed. Cir. 1995), en banc, *aff'd* 517 U.S. 370 (1996). First, the claims must be construed to determine their scope as a matter of law. *Id.* The meaning of the 446 Patent claims is the subject of the parties' briefs on claim construction. Second, the properly construed claims must be compared to the accused device, FiberWire, to determine whether FiberWire contains every claim limitation either literally or under the doctrine of equivalents. *Id.*; *Leggett & Platt, Inc. v. Hickory Springs Mfg. Co.*, 285 F.3d 1353, 1358-59 (Fed. Cir. 2002). Infringement,

whether literal or under the doctrine of equivalents, is a question of fact. *Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 812 (Fed. Cir. 2002).

Even if a claim limitation is not met literally by an accused device, there may be infringement under the doctrine of equivalents if there are only “insubstantial differences” between the missing claim element and the corresponding aspect of the accused device. *Warner-Jenkinson Co., Inc. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 24 (1997) citing *Graver Tank & Mfg. Co. v. Linde Air Products Co.*, 339 U.S. 605, 610 (1950). One recognized way to determine whether the differences are “insubstantial” is to analyze whether the component in the accused device performs substantially the same function as the claimed limitation, in substantially the same way, to achieve substantially the same result. *Warner-Jenkinson*, 520 U.S. at 39-40; *Graver Tank*, 339 U.S. at 610.

Under FED. R. CIV. P. 56, summary judgment is only proper where the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no genuine issue of material fact and the moving party is entitled to judgment as a matter of law. Accordingly, Arthrex, as the movant, bears the burden of proving that there is no genuine issue of material fact and that it is entitled to a judgment of noninfringement as a matter of law. *Celotex Corp. v. Catrett*, 477 U.S. 317, 322 (1986). Because Mitek is the nonmovant, Mitek’s burden here is simply to show that there is sufficient evidence for a jury to return a verdict on the infringement issues in its favor. *A.B. Chance Co. v. RTE Corp.*, 854 F.2d 1307, 1311 (Fed. Cir. 1988). As Mitek is the nonmovant, all reasonable doubts and inferences must be drawn in its favor. *Id.*

Arthrex’s summary judgment motion is based on two elements of the 446 Patent claims. It alleges that its FiberWire sutures do not infringe the claims because they do not have “PE,” as

recited in the claims, and because their coating materially changes the basic and novel properties of the sutures, so that they are removed by the “consisting essentially of” language in the claims. (Arthrex Br. at 2-3). As explained below, Arthrex has not met its burden of establishing entitlement to judgment as a matter of law on the infringement issue, and, at the very least, there are genuine issues of material fact which preclude summary judgment.

B. Arthrex Has Not Met Its Summary Judgment Burden With Respect to the “First Fiber-Forming Material” Claim Element

The 446 Patent claims all recite a surgical suture that consists essentially of a braid composed of a first and second set of continuous and discrete yarns, where

each yarn from the first set is composed of a plurality of filaments of a first fiber-forming material selected from the group consisting of PTFE, FEP, PFA, PVDF, PETFE, PP and *PE*.

(Mitek Fact 128, emphasis added)². Arthrex moves for summary judgment of noninfringement alleging that the “PE” limitation of the 446 Patent claims is not found literally or equivalently in its FiberWire products. Arthrex’s motion is predicated upon the Court adopting Arthrex’s erroneous construction for “PE,” namely, “general purpose PE” (Arthrex Br. at 9). If the Court adopts *Mitek*’s definition of “PE,” then Arthrex’s noninfringement arguments with respect to the “PE” or “first fiber forming material” limitation are moot. If, however, the Court adopts Arthrex’s erroneous construction, Arthrex is still not entitled to summary judgment because there are genuine issues of material fact precluding such judgment and because Arthrex has not established entitlement to judgment as a matter of law. Mitek addresses those two issues below.

² Mitek Memorandum is supported by its Response Statement of Facts and Exhibits attached thereto, which include the expert Declarations of Dr. Hermes and Dr. Brookstein. Mitek’s Statement of Facts is cited as “Mitek Fact #” starting at #128, which is the next fact after Mitek’s Statement of Facts filed with its Motion for Summary Judgment of Infringement and No Inequitable Conduct, filed on August 11, 2006. Mitek has also moved to strike Arthrex’s Ex. 3 which is inadmissible hearsay.

1. Arthrex Has Not Met Its Burden of Establishing that There is No Literal Infringement

Arthrex contends that, because FiberWire's ultra high molecular weight PE is not "general purpose PE" (its erroneous construction of the claim term "PE"), there is no literal infringement. The problem is, Arthrex has not defined the litigation-inspired term "general purpose PE." Instead, it appears to rest on the mere assertion that the labels "general purpose" and "ultra high molecular weight" are different. But these labels provide no relevant information. Mitek's expert, Dr. Brookstein, notes by declaration that ultra high molecular weight PE has many uses (Mitek Fact 129).

Arthrex has not proven that it is entitled to judgment as a matter of law that ultra high molecular weight PE is not literally a "general purpose PE." At the very least, there are genuine issues of material fact underlying the issue.

2. There Are Factual Issues Regarding Whether FiberWire's Ultra High Molecular Weight PE is Equivalent to the "First Fiber-Forming Materials"

The infringement inquiry does not end with the literal infringement inquiry. FiberWire may infringe under the doctrine of equivalents, and application of the doctrine of equivalents is a "highly factual inquiry."³ There are genuine issues of material fact underlying the issue of whether ultra high molecular weight PE is an equivalent to the "first fiber forming materials" recited in the claims.⁴

³ *Jeneric/Pentron, Inc. v. Dillon Co., Inc.*, 205 F.3d 1377, 1384 (Fed. Cir. 2000); *see also Toro Co. v. White Consol. Indus., Inc.*, 266 F.3d 1367, 1369 (Fed. Cir. 2001) ("intensely factual inquiry").

⁴ Arthrex mentions, but does not present an argument with respect to, the issue of whether the doctrine of prosecution history estoppel precludes Mitek's reliance on the doctrine of equivalents (Arthrex Br. at 10, n. 9). Since Arthrex chose not to argue the point in its opening brief, it may not do so in its reply brief. Nonetheless, Mitek notes that the *Festo* presumption of surrender is rebutted under the present circumstances. The presumption of surrender may be rebutted when the rationale underlying the amendment [bears] no more than a tangential relation

**a) Dr. Brookstein's Declaration Testimony Regarding
Equivalence Precludes Granting Summary Judgment**

Mitek's expert, Dr. David Brookstein, provided two different and consistent analyses as to why FiberWire's ultra high molecular weight PE is equivalent to the claimed first fiber-forming materials (Mitek Fact 130). Either one of these is sufficient evidence to defeat Arthrex's motion, either because they show that Arthrex is not entitled to judgment as a matter of law or, at the least, because the evidence raises genuine issues of material fact.

**(1) Dr. Brookstein's "Insubstantial Differences"
Analysis Defeats Summary Judgment of
Noninfringement**

As noted above, a claim element may be met under the doctrine of equivalents if the differences between the claim element and the corresponding element in the accused device are insubstantial. Dr. Brookstein opined that any differences between FiberWire's ultra high molecular weight PE and the claimed first fiber-forming materials are insubstantial because FiberWire's PE is consistent with the description of the preferred embodiments of the first fiber-forming materials in the 446 Patent (Mitek Fact 131).

For example, the 446 patent describes the preferred embodiments of the first fiber-forming materials as "lubricating yarns," "nonabsorbable polymers," and "fiber-forming materials" (Mitek Fact 132). Dr. Brookstein pointed out that FiberWire's PE is a lubricous, non absorbable, and fiber-forming material (Mitek Fact 133) and concluded that differences between the materials are therefore insubstantial. Notably, Arthrex' liability expert, Dr. Mukherjee,

to the equivalent in question. *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 535 U.S. 722, 740 (2002). The focus of tangential-relation criterion is the patentee's objectively apparent reason for the narrowing amendment. *Festo Corp. v. Shoketu Kinzoku Kogyo Kabushiki Co., Ltd.*, 344 F.3d 1359, 1369 (Fed. Cir. 2003). Here, the reason for the amendment that led to recitation of the specific fiber-forming materials was to exclude certain bioabsorbable materials (see Section IV.A.2(b) of Mitek's Opening Brief in Support of Claim Construction), not to exclude high tensile materials.

agrees that FiberWire's PE is lubricous and fiber-forming (Mitek Fact 134), and there is no dispute that FiberWire's PE is not bioabsorbable (Mitek Fact 135).

Dr. Brookstein further opined that his "insubstantial differences" opinion is supported by the construction of FiberWire. As Dr. Brookstein explained, the 446 patent describes embodiments in which PE is braided with PET, the PE is a lubricating yarn, and the PET improves strength of the heterogeneous braid (Mitek Fact 136). FiberWire is a braid of PE with PET, the PE is lubricous, and the PET imparts strength (namely at least knot holding strength)⁵ to the heterogeneous braid (Mitek Fact 137).

Dr. Brookstein's opinion is supported by the testimony of Mr. Grafton, who was Arthrex's Vice President of Engineering and the alleged designer of FiberWire (Mitek Fact 138). Mr. Grafton testified that, originally, Arthrex had considered a 100% ultra high molecular weight PE braid (Mitek Fact 139). But Mr. Grafton found this braid unacceptable because it was too lubricous and weak; it would not hold a knot (Mitek Fact 140). Accordingly, Arthrex discarded the idea of using ultra high molecular weight PE until Mr. Grafton thought of braiding PET with the lubricous ultra high molecular weight PE, so that the PET could impart knot holding strength to the braid and overcome the lubricous ultra high molecular weight PE's disadvantages (Mitek Fact 141). Thus, Mr. Grafton's testimony about the development of FiberWire underscores that FiberWire is a braid of a lubricous first fiber-forming material with a second fiber-forming material to impart braid strength, like certain of the preferred embodiments in the 446 Patent (Mitek Fact 142).⁶

⁵ Knot holding strength is a recognized suture strength property and is the force at which a knot fails by slipping, elongating to a certain extent, or breaking (Mitek Fact 137, n. 1)

⁶ Dr. Brookstein's opinion is further supported by Arthrex's own admissions in its U.S. Patent No. 6,716,234 (Mitek Fact 143) that ultra high molecular weight PE "does not have acceptable knot tie down characteristics for use in surgical applications" (Mitek Fact 143). Mr.

**(2) Dr. Brookstein's Function/Way/Result Analysis
Defeats Summary Judgment of Noninfringement**

As explained above, another proper doctrine of equivalents analysis is whether the corresponding element in an accused device performs the same function, in substantially the same way, to achieve substantially the same result, as the missing claim element. Dr. Brookstein also provided a function/way/result analysis in support of his opinion that the differences between ultra high molecular weight PE and the recited first fiber-forming materials are insubstantial (Mitek Fact 146).

Based on the 446 Patent, Dr. Brookstein explained that:

- the function of the first fiber-forming materials is to contribute a property that is different than a yarn from the claimed second set of materials (Mitek Fact 147);
- the “way” the claimed first fiber-forming materials perform their function is to have “at least one yarn from the first set of yarns in direct intertwining contact with at least one yarn from the second set” (Mitek Fact 148);
- the “result” was “to contribute to the heterogeneous suture braid a property different from the yarn in the second set, so that, when they are braided, the yarns contribute to the properties of the overall heterogeneous braid” (Mitek Fact 149).

As Dr. Brookstein explained, FiberWire's braided PE performs these functions and obtains the same result in the same way as the recited first fiber-forming materials because it contributes lubricity and strength properties that are different than the second fiber-forming material, PET, and is braided in direct intertwining contact with at least one PET yarn (Mitek Fact 150).

**(3) Arthrex's Pot Shots at Dr. Brookstein's Analyses
Are Unfounded**

Grafton, a named inventor of the 234 patent, testified that knot tie down as that term is used in his patent is closely related to knot strength, namely the “ability to approximate the tissue and hold [tissue] in place through biomechanical forces” in the body (Mitek Fact 144). According to Arthrex's 234 patent, this deficiency was overcome by braiding the lubricous PE with polyester or PET (Mitek Fact 145).

Arthrex argues that Dr. Brookstein incorrectly identifies the “function” in his function/way/result analysis because the alleged function and purpose of the first fiber-forming materials should be limited to “improving pliability” (Arthrex Br. at 11, 12). But this is just Arthrex attorney argument, unsupported by expert testimony. In fact, Arthrex’s expert, Dr. Mukherjee, had a different opinion about the “function” of the first fiber-forming material.⁷ Arthrex’s attorney arguments are no substitute for the admissible evidence required on summary judgment.⁸

Arthrex erroneously argues that Dr. Brookstein’s analysis of the “function” of the first fiber-forming materials bears no relation to the claims and prosecution history. But Dr. Brookstein expressly relied on the broad teachings of the 446 patent with respect to the functions of the first fiber-forming materials:

- “heterogeneous braids may exhibit a combination of outstanding properties attributable to the specific properties of the dissimilar fiber-forming materials which makeup the yarns” (Mitek Fact 152);
- “it is possible to tailor the physical . . . properties of the braid by varying the type and proportion of each of the dissimilar fiber forming used” (Mitek Fact 153);

⁷ According to Dr. Mukherjee, “the function performed by the first fiber-forming materials is to add lubricity with the recognition that these materials will detract from the strength of the resulting suture” (Mitek Fact 205). After Dr. Mukerjee admitted under cross-examination that FiberWire’s PE is lubricious (Mitek Fact 151), and Arthrex’s admissions that FiberWire’s PE detracts from the FiberWire’s strength were brought to Arthrex’s attention (*see supra* 7), Arthrex apparently decided it could not live with Dr. Mukherjee’s opinion, and redefined the “function” here.

⁸ *Invitrogen Corp. v. Clontech Labs., Inc.*, 429 F.3d 1052, 1068 (Fed. Cir. 2005) (holding that “[u]nsubstantiated attorney argument regarding the meaning of technical evidence is no substitute for competent, substantiated expert testimony” and attorney argument “does not, and cannot, support Clontech’s burden on summary judgment”); *Enzo Biochem, Inc. v. Gen-Probe, Inc.*, 424 F.3d 1276, 1284 (Fed. Cir. 2005) (“[a]ttorney argument is no substitute for evidence”); *Glaverbel Societe Annoyme v. Northlake Mktg. & Supply, Inc.*, 45 F.3d 1550, 1562 (Fed. Cir. 1995) (attorney argument is insufficient basis for granting summary judgment).

- in *preferred embodiments* the first fiber-forming materials can contribute other properties including “pliability,” “compliance” and “surface lubricity” (Mitek Fact 154, emphasis added).

Out of these broad teachings, Arthrex picks one property, pliability, as the “function” of the first fiber-forming materials. But the very sentence on which Arthrex relies (the last sentence referenced above) refers not only to pliability but also in the alternative to *compliance and surface lubricity* (446 Patent at 4:12-13). Arthrex provides no explanation for selectively truncating this sentence and ignoring the alternative “or” language. Further, Arthrex inexplicably ignores the fact that the listed properties are for “preferred embodiments,” not the invention as a whole (Mitek Fact 156). Arthrex’s criticisms of the breadth of Dr. Brookstein’s analysis as not supported by the intrinsic record are wrong and, in any event, ignore that there are at the very least genuine issues of material fact surrounding the definition of the “function” of the first fiber-forming materials.

3. Arthrex’s Counsel’s Nonequivalency Arguments Are An Insufficient Basis For Granting Summary Judgment In the Face of Expert Testimony

Arthrex sets forth an insubstantial differences argument (Arthrex Br. at 10-11), but it is based on a definition of the function of the first fiber-forming materials that is unsupported and contrary to the record evidence.

Arthrex incorrectly alleges that a “braid made solely of” the first set of yarns (*e.g.*, PTFE, FEP, PFA, PVDF, PETFE, and PE) is described in the 446 Patent as “‘highly pliable’” and “‘weak’” and that, since *one* braid of ultra high molecular weight PE was not highly pliable, and ultra high molecular weight PE is “strong,” ultra high molecular weight PE cannot be equivalent (Arthrex Br. at 10-11). This argument is unfounded.

The one sentence from the 446 patent on which Arthrex relies for this proposition *does not state* that the first set of yarns all necessarily form highly pliable braids and *does not describe* the first fiber-forming *materials* as weak:

“[i]f fibers composed of *highly lubricous polymers* are used in the traditional manner, then a *highly pliable braid* can be prepared. However, *in most cases, these braids will be relatively weak and unusable*”

(Mitek Fact 157) (emphasis added). Significantly, this sentence refers to *braids* of “highly lubricous polymers” and does not state that all permutations of the first set of *yarns* are necessarily the “highly lubricous polymers” mentioned. Further, this sentence states that “highly pliable braids *can* be prepared,” but that does not mean that *all braids* made from the materials are highly pliable because they can have different stiffness characteristics or be heat treated or processed in different ways to make the braids less pliable (Mitek Fact 206). Also, the sentence says that “*in most cases,*” not all cases, these braids will be relatively weak (Mitek Fact 207). Finally, this sentence only refers to some *braids* as being weak, not the braided *materials* as being weak, as Arthrex incorrectly suggests (Mitek Fact 208). Thus, contrary to Arthrex’s suggestion, the 446 patent does *not* say that *all braids* made from *all of the first fiber forming materials* are *all* necessarily highly pliable *or* that the materials used to make the braids are weak (Mitek Fact 158).

As Dr. Brookstein explained, the first fiber-forming materials are never described as “weak” (Mitek Fact 159). In fact, PVDF and polypropylene (PP), which are among the materials listed in the group of first fiber-forming materials, are not “weak” (Mitek Fact 160). Like polyethylene, *polypropylene* (PP) is also available in an ultra high molecular weight form (Mitek

Fact 161). Thus, Arthrex's assertions that the 446 Patent describes the first fiber-forming materials as "weak" are unsupported and contrary to the teachings of the 446 Patent itself.⁹

Arthrex further alleges that the 446 Patent accepts the fact that the "first set of yarns will somewhat weaken the braid because the increases in pliability from the first set of yarns will outweigh the loss of strength" (Arthrex Br. at 11). This, too, is attorney spin and not what the 446 Patent states. Arthrex cites to column 2, lines 26-28 for this argument. But this sentence discusses "*conventional*" braided *homogeneous* sutures, not the inventive heterogeneous braids (emphasis added). Further, although the patent says it would be *desirable* to form a braid with "enhanced pliability . . . without appreciably sacrificing physical properties," this is just one possible goal of the invention (Mitek Fact 209). In any event, even if Arthrex's characterization were correct, it remains the fact that FiberWire's PE *does* detract from strength and *does* improve braid pliability (Mitek Fact 210).

4. Even if Arthrex Is Correct About the "Pliability" Function, Any Differences Between FiberWire's PE and the First Fiber-Forming Materials Are Still Insubstantial

Even if this Court were to accept Arthrex's *counsel's* definition of the function of the first fiber-forming materials as being to impart pliability, Arthrex is still not entitled to summary judgment of noninfringement because of genuine issues of material fact.

According to Arthrex's counsel, ultra high molecular weight PE is "stiff," and therefore apparently cannot improve FiberWire's overall pliability. But there is evidence to the contrary. As Dr. Brookstein testified, FiberWire's PE is lubricous, while FiberWire's PET has different lubricity (Mitek Fact 163). Dr. Brookstein further explained that FiberWire's PE contributes to

⁹ Nevertheless, ultra high molecular weight PE is "weak" in at least two ways, knot holding properties and compression (Mitek Fact 162) and braids of ultra high molecular weight PE are weak (Mitek Fact 162). Thus, even if is Arthrex is correct (which it is not) that the 446 Patent describes the first fiber-forming materials as "weak" and braids made from them as weak, ultra high molecular weight PE satisfies these requirements.

braid pliability because its lubricity allows the fibers and yarns to slide past each other when FiberWire bends (Mitek Fact 164).

Arthrex's argument appears to be based on confusing two discrete concepts, *material* stiffness and *braid* stiffness. Fiber *material* stiffness is a property dependent upon just the material (Mitek Fact 211). In contrast, *braid* stiffness is dependent upon many parameters, including not only the stiffness of the braided materials, but also the manner in which they are braided, and, importantly, material lubricity (Mitek Fact 212). As the 446 Patent explains, material lubricity permits fiber-to-fiber mobility, so that when the braid is bent, the fibers can easily bend and slide past other fibers (Mitek Fact 165). Thus, even accepting that ultra high molecular weight PE is "stiff," Arthrex's counsel's assertions that it does not improve overall braid pliability are just wrong.

Arthrex further alleges that there is no equivalence as a matter of law because "*the admitted purpose* of FiberWire's PE is to add strength to the braid" and suggests that this differs from the claimed first fiber-forming materials which are alleged to provide improved pliability and handleability (Arthrex Br. at 11) (emphasis added). But this allegation is an over simplification and is not accurate. As Dr. Brookstein described, ultra high molecular weight PE has many purposes. It provides braid lubricity, surface properties, handleability properties, tensile strength, and detracts from knot holding strength (Mitek Fact 166). The mere fact that ultra high molecular weight PE may add tensile strength properties to the braid, in addition to improving lubricity, handleability, surface properties, and braid flexibility is irrelevant.

Boehringer Ingelheim Vetmedica, Inc. v. Schering-Plough Corp., 320 F.3d 1339, 1351-52 (Fed. Cir. 2003) (finding that the relevant analysis in doctrine of equivalents is "the role played by each element in the context of the specific patent claim, and not whether the accused element is

capable of performing different roles than the claim element in other contexts”) (internal citations omitted).

5. The Issue of Whether FiberWire Meets the “First Fiber-Forming Material” Limitation Cannot Be Disposed of on Summary Judgment

In summary, Arthrex has not met its burden of establishing that it is entitled to judgment as a matter of law that FiberWire fails to meet the “first fiber-forming material” element of the 446 Patent claims. At the very least, there are genuine issues of material fact precluding summary judgment, such as whether ultra high molecular weight PE is a “general purpose PE,” what the “function” of the claimed first fiber-forming materials are, and whether any differences between ultra high molecular weight PE and the first fiber-forming materials are substantial.

C. Arthrex Has Not Met Its Summary Judgment Burden With Respect to “Consistent Essentially Of”

The claims of the 446 patent contain the transitional phrase “consisting essentially of.” Claims having the phrase “consisting essentially of” occupy a middle ground between closed claims that are written in a “consisting of” format and fully open claims that are drafted in a “comprising” format. *PPG Indus. v. Guardian Indus. Corp.*, 156 F.3d 1351, 1354 (Fed. Cir. 1998). Claims using “consisting essentially of” language cover products that include the listed ingredients and unlisted ingredients that do not materially affect the basic and novel properties of the invention. *Id.*

The question of what are the novel and basic characteristics of the invention claimed in the 446 Patent is a subject of the parties’ claim construction briefs. The question of whether an unlisted ingredient has a *material* effect on the novel and basic characteristics is a question of fact. *Id.* at 1354-55. Here, Arthrex primarily contends that FiberWire’s coating has a material effect on the novel and basic characteristics, *as those characteristics are defined by Arthrex*. If

the Court agrees with *Mitek's* construction of the novel and basic characteristics, then Arthrex's summary judgment arguments relating to the "consistent essentially of" language are moot. If the Court agrees with Arthrex's construction, summary judgment should still be denied because Arthrex has not come forward with evidence showing it is entitled to judgment and, at the very least, there are genuine issues of material fact precluding summary disposition.

1. There Is Substantial Evidence that FiberWire's Coating Does Not Have A Material Effect on Handleability

Arthrex (erroneously) defines the novel and basic characteristics of the claimed invention as "two dissimilar yarns braided together to achieve improved handleability or pliability without significantly sacrificing its physical properties" (Arthrex Br. at 13). Arthrex asserts that FiberWire's coating affects handleability (Arthrex Br. at 14), and does not address its affect on pliability or physical properties; therefore, Mitek addresses only the evidence of whether the coating materially affects handleability.

There is substantial evidence that FiberWire's coating does *not* materially affect FiberWire's handleability or knot tie down properties. This evidence includes the admissions of Dr. Richard Burks, an Arthrex expert, and Dr. Brookstein's testimony.

Dr. Burks is an experienced orthopedic surgeon who has been performing surgery since about 1978 (Mitek Fact 167). Dr. Burks allegedly conducted a blind test, including a knot tie down/handleability test, of uncoated and coated FiberWire for Arthrex and at his deposition (Mitek Fact 168). After examining the samples, Dr. Burks twice admitted that the differences between the coated and uncoated samples were "subtle" (Mitek Fact 169); the coated and uncoated sutures were "pretty close" (Mitek Fact 169); and he "could not clearly feel a difference" between the two sutures (Mitek Fact 169). As Dr. Burks admitted the differences were not material:

- Q. How would you qualify the difference that you just observed, based on your test?
- A. When you say "qualify" are you asking for like an amount?
- Q. How would you characterize the difference between the sutures?
- A. *Well the difference is, I think, subtle and there's no doubt in my mind that I could line up, you know, a hundred sutures and have error where I would say, you know, I think this one is one way or the other and make a mistake. So there's certainly not enough difference to clearly say that I know every time exactly how that feels.*

(Mitek Fact 170) (emphasis added).

Not only did Dr. Burks testify that the differences were “subtle” in a non-surgical environment, he even admitted that the coating might not even make a difference in the surgical environment. Surgeons normally handle FiberWire in the surgical environment while wearing gloves (Mitek Fact 171). When Dr. Burks conducted the blind test for Arthrex, he admitted that he may not have been able to tell a difference if he had had his gloves on (Mitek Fact 172). Dr. Burks further admitted that gloves “make a difference” in whether he could distinguish between coated and uncoated FiberWire (Mitek Fact 173). Since surgeons are the ones who handle and tie down sutures, Dr. Burks’ uncontested testimony that FiberWire’s coating is immaterial in the eyes of a surgeon precludes granting summary judgment for Arthrex.

In addition to Dr. Burks’ admissions, Dr. Brookstein also opined that FiberWire’s coating does not have a material effect, even under Arthrex’s definition of the novel and basic characteristics of the invention. He pointed out that FiberWire’s coating is just silicone applied thinly to the braided suture as a surface lubricant (Mitek Fact 174), as opposed to a monofilament-like coating which would materially affect fiber-to-fiber mobility (Mitek Fact 174). Dr. Brookstein examined magnified images of FiberWire, determined the amount of

silicone coating on FiberWire, and confirmed that the silicone was present in small amounts and did not substantially penetrate the braid and create a monofilament like structure (Mitek Fact 175). As Dr. Brookstein explained, regardless of FiberWire's coating, FiberWire is still "two dissimilar yarns braided together to achieve improved handleability or pliability without significantly sacrificing its physical properties" (Mitek Fact 176). Dr. Brookstein's opinions are evidence that FiberWire's thin silicone coating does not materially affect FiberWire's braid properties and, at the very least, show that there are genuine issues of material fact precluding summary judgment.

2. Arthrex's Motion Should Be Denied Because It Fails to Proffer Evidence Showing A Material Effect

Arthrex's motion for summary judgment should also be denied because it offers a legal test for what constitutes a "material affect" but then offers no testimony from one of ordinary skill in the art evidence in support of that test. According to Arthrex, the test for materiality is whether "the affect is of importance or of consequence to those of ordinary skill in the art" (Arthrex Br. at 13, n. 14, citing *PPG Indus. v. Guardian Indus. Corp.*, 156 F.3d 1351). But Arthrex offers no evidence on this point. Although it cites to a number of documents, it only alleges that they show that "coating *affects* handleability characteristics of the braid" (Arthrex Br. at 14). Significantly, Arthrex does not allege that the documents describe "material" effects. Attorney assertion regarding "materiality" is no basis for granting summary judgment. *See supra*, n. 7.

Not only does Arthrex lack any evidence of the "materiality" of alleged effects on the basic and novel properties of FiberWire sutures, but its arguments about effects in general are deficient because they focus not on the particular effects of *FiberWire's* silicone coating, but on suture coatings in general, divorced from the context of the invention. FiberWire has a very

specific silicone coating that is applied to its surface (Mitek Fact 177). Arthrex lists six bullet points relating to suture coatings in general (Arthrex Br. at 14-15), none of which are specific to FiberWire's silicone coating (*id.*). The only thing specific to FiberWire that Arthrex cites is the set of FiberWire instructions for use, but to no avail. The instructions for use refer to the coating on Fiberwire as a mere "lubricant," (Arthrex Ex. 14); they say nothing to support an argument that the coating materially affects the pliability of the suture.

3. Arthrex's Analysis Should Be Rejected Because The Patent Itself Shows That The Effects of Coatings Are Not Material

Arthrex's motion should further be denied because the proposition that a surface coating, as on FiberWire, could materially affect the basic and novel properties of the claimed suture is inconsistent with the teachings of the 446 patent.

In considering whether an effect is material, courts generally consider the intrinsic record, which includes the patent itself.¹⁰ The 446 Patent specification defines coatings, such as FiberWire's, as optional or immaterial:

If desired, the surface of the heterogeneous multifilament braid can be coated . . . to further improve handleability and knot tiedown performance of the braid.

(Mitek Fact 178) (emphasis added). Further, the 446 Patent specification draws a distinction between surface coatings, like FiberWire's, which do not significantly affect fiber-to-fiber mobility, and heavy coatings which significantly restrict fiber-to-fiber mobility and form monofilament-like structures (Mitek Fact 179). Thus, the patent evidences that coatings, such as FiberWire's, do not *materially* affect any basic and novel properties of the patented suture. *See*,

¹⁰ *PPG Indus.*, 156 F. 3d at 1356-57 (considered patent specification and prosecution history in considering whether effects are material); *AK Steel Corp. v. Sollac*, 344 F.3d 1234, 1239 (Fed. Cir. 2003) (considering what patent specification characterized as a material affect); *Bayer AG v. Sony Elecs., Inc.*, 229 F. Supp. 2d 332, 334 (D. Del. 2002) (considered prosecution in determining what was a material affect); *BASF Corp. v. Eastman Chem. Co.*, No. 95-746-RRM, 1998 U.S. Dist. LEXIS 23054, *28-30 (D. Del. Mar. 24, 1998) (Ex. A).

Ex parte Boukidis, 154 U.S.P.Q. 444, 444 (B.P.A.I. 1966) (finding that the expression consisting essentially of does not exclude ingredients from the scope of the claims when the specification clearly indicates that other ingredients may be present); *See also Bayer AG*, 229 F. Supp. 2d at 344 (finding that there was no exclusion *per se* based on the intrinsic record).

4. Arthrex's Motion For Non Infringement Under Mitek's Construction Is Conclusory and Should Be Rejected

Arthrex half-heartedly contends in a footnote that FiberWire's coating has a material effect under Mitek's construction of the basic and novel characteristics (Arthrex Br. at 16, n.18). Arthrex offers no evidence of any such effects. It offers no evidence of any effect with respect to FiberWire's PE and PET being dissimilar, nonbioabsorbable, or contributing their individual contributions to FiberWire's properties. Tellingly, Arthrex's experts did not offer opinions under Mitek's construction. Dr. Brookstein's affidavit and testimony from Dr. Mukherjee, establishing that the coating on FiberWire does not materially affect its novel and basic characteristics, as they are defined by Mitek, are of record (Mitek Fact 180).

5. The Issue of Whether FiberWire Avoids Infringement Because of Its Coating Cannot Be Disposed of on Summary Judgment

In summary, Arthrex has not met its burden of establishing that it is entitled to judgment as a matter of law that FiberWire is non-infringing because its coating allegedly materially affects the basic and novel properties of the suture. At the very least, there are genuine issues of material fact precluding summary judgment, including what whether FiberWire's coating materially affects those properties.

III. Arthrex Has Not Met Its Burden of Showing It Is Entitled to Summary Judgment of Invalidity

A. Arthrex Bears a Heavy Burden of Proving Anticipation As A Matter of Law

Patents are presumed by law to be valid. 35 U.S.C. §282. Therefore, to prove entitlement to summary judgment, Arthrex has the burden of proving that the 446 Patent claims are anticipated by clear and convincing evidence. *Atofina v. Great Lakes Chem. Corp.*, 441 F.3d 991, 999 (Fed. Cir. 2006); *Helifix, Ltd. v. Blok-Lok, Ltd.*, 208 F.3d 1339, 1346 (Fed. Cir. 2000); *Ultra-Tex, Surfaces, Inc. v. Hill Brothers Chem. Co.*, 204 F.3d 1360, 1367 (Fed. Cir. 2000). To show anticipation, Arthrex must first establish that the allegedly invalidating reference, the 575 patent, qualifies as prior art. *Mahurkar v. C.R. Bard, Inc.*, 79 F.3d 1572, 1578 (Fed. Cir. 1996). Arthrex must further prove that each limitation of the 446 patent claims is disclosed in that single reference. *Atofina*, 441 F.3d at 999; *Helifix Ltd.*, 208 F.3d at 1346. Moreover, Arthrex must prove, clearly and unequivocally, that the 575 Patent itself describes “all elements of [the] claimed invention arranged as” claimed. *Carella v. Starlight Archery & ProLine Co.*, 804 F.2d 135, 138 (Fed. Cir. 1986) (citation omitted); *Continental Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1267 (Fed. Cir. 1991).

On summary judgment, Arthrex further bears the burden of proving that there is no genuine issue of material fact regarding anticipation when the evidence is viewed through the prism of Arthrex’s high evidentiary burden of clear and convincing evidence. *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 247-48 (1986). The issues of whether a reference is prior art and what it teaches are questions of fact. *Med. Instr. & Diagnostics Corp. v. Elekta AB*, 344 F.3d 1205, 1221 (Fed. Cir. 2003) (“The question of what a reference teaches and whether it describes every element of a claim is a question for the finder of fact.”); *Rockwell Int’l Corp. v. U.S.*, 147 F.3d 1358, 1364 (Fed. Cir. 1998) (issue of reduction to practice is a question of fact).

Arthrex's motion for summary judgment of invalidity should be denied because (i) there are, at the very least, factual issues regarding whether the 575 Patent teaches all of the claim limitations, arranged in the same way, as recited in the claims; (ii) Arthrex's proofs are insufficient as a matter of law; and (iii) there are, at the very least, factual issues regarding whether the 575 Patent even qualifies as prior art.

B. Arthrex's Motion Should Be Denied Because There Are Factual Issues Regarding Whether the 575 Patent Anticipates

Arthrex's motion should be denied because there are factual issues regarding whether the 575 Patent teaches a suture having all of the limitations recited in the 446 Patent claims, arranged in the manner recited in the 446 Patent claims. Issues of fact are raised at the very least by Arthrex's own admissions regarding the disclosure of the 575 Patent and by expert testimony from Dr. Hermes, Mitek's expert, and from Dr. Mukherjee, Arthrex's expert.¹¹

1. Arthrex's Admissions Belie Its Current Contentions Regarding the Disclosure of the 575 Patent

Arthrex incorrectly alleges that the 575 Patent anticipates the 446 Patent claims because it allegedly describes a suture having the PE/polyester (PET) braid as claimed in the 446 Patent. When Arthrex wanted to get its own patent, it told the Patent Office a different story.

In 2001, Arthrex applied for a patent related to its FiberWire product (234 Patent) (Mitek Fact 181). The Patent Office rejected Arthrex's claims over the 575 Patent asserted here by Arthrex against Mitek's patent (Mitek Fact 182). In response to that rejection, Arthrex argued

¹¹ *Xerox Corp. v. 3Com Corp.*, No. 04-1470, 2006 U.S. App. LEXIS 14050, at *34 (Fed. Cir. June 8, 2006) (vacating grant of summary judgment of anticipation where there was conflicting evidence regarding the teachings of a reference) (Ex. B); *Med. Insts.*, 344 F.3d at 1221 (reversing grant of summary judgment on anticipation issue because district court improperly usurped jury's function where there was conflicting expert testimony regarding what the reference teaches); *Rockwell Int'l Corp.*, 147 F.3d at 1364 (affirming denial of summary judgment of anticipation where there was conflicting evidence about the teachings of the allegedly anticipatory reference).

that the 575 Patent “*does not disclose* an example of a braided sheath that includes a blend of both ultra high molecular weight polyethylene and polyester” (or PET) (Mitek Fact 183) (emphasis added).¹² When Arthrex’s expert, Dr. Mukherjee, was advised of this admission during his expert deposition, he reversed his position and agreed that that the 575 Patent did not teach a PE/polyester braid (Mitek Fact 185).

Arthrex cannot have it both ways. It cannot tell this Court that the 575 Patent discloses a PE/polyester braid, for the purposes of attacking Mitek’s Patent, when it has told the Patent Office that the 575 Patent does *not* disclose such a braid. On the basis of the evidence of this admission alone, there is at the very least a genuine issue of material fact, relating to the disclosure of the 575 Patent, which precludes grant of summary judgment.

2. There Are Factual Issues Regarding Whether the Spiroid Braid of the 575 Patent Anticipates

The 446 Patent claims are to a suture, but the 575 Patent discloses “suture repair products.” These products include tapes (e.g., Figures 3 and 4) and hollow braided members (Figure 8) which Arthrex does *not* allege to anticipate the 446 Patent claims. Rather, Arthrex’s argument focuses on the spiroid braided construction depicted in Figure 6 of the 575 Patent. There are genuine issues of material fact regarding whether the description of the spiroid braid depicted in Figure 6 anticipates the 446 Patent claims.

The 575 Patent discloses that the spiroid braid of Figures 6 is comprised of a high molecular weight, high strength material and a bioabsorbable material (Mitek Fact 186). Even if the high molecular weight, high strength material is understood to be ultra high molecular weight PE – one of the first fiber-forming materials recited in the 446 Patent claims – there is no

¹² Arthrex and Dr. Mukherjee admit that polyester includes PET (Arthrex Br. 25, n.22; Mitek Fact 184).

disclosure that the *second* material in the structure is one of the materials required by the claims, namely, PET, nylon or aramid (non-bioabsorbable materials) (Mitek Fact 187).

Recognizing that the description of the *only* structure in the 575 Patent on which it is relying for anticipation does not mention any of the claimed second fiber-forming materials, Arthrex resorts to pulling “disclosure” of “polyester” from Claim 12 of the 575 Patent. But Claim 12 is not directed to a spiroid braid having the structure of Figure 6, or, for that matter, having a structure anything like the structure claimed in the 446 Patent claims.¹³ Rather, Claim 12 is directed, broadly, to a method for repairing split portions of body tissue or a sternum closure device (Mitek Fact 190).

Not only do the 575 Patent claims not describe a suture, but contrary to Arthrex’s allegations, they also do not describe PE braided in direct intertwining contact with polyester, as required in the 446 Patent claims (Mitek Fact 191). Although claim 12 refers to polyester, it does not expressly specify how the polyester fibers are braided with the claimed first fibers of PE (Mitek Fact 192). Nor is there an inherent or necessary disclosure of braided intertwining contact in the 575 Patent claims; there is merely a recitation of “braided” which could be a construction, such as a core-sheath arrangement as described in Figures 8 and 9, which is not a “direct intertwining contact” construction (Mitek Fact 193).

Thus, there is no express disclosure in the 575 Patent of a suture, *as recited in the 446 Patent claims*, having heterogeneous yarns braided in direct intertwining contact, where a first set of yarns is composed of a plurality of filaments of a material selected from PTFE, FEP, PFA, PVDF, PETFE, PP and PE, and where a second set of yarns is composed of a plurality of

¹³ As Dr. Hermes testified, the *claims* of the 575 Patent claims describe use of a sternum closure ribbon or tape, not a suture (Mitek Fact 188). Arthrex’s counsel, Mr. Soffen, also advised Arthrex that the 575 Patent claims do not describe the use of a suture (Mitek Fact 189).

filaments of a material selected from PET, nylon and aramid. Arthrex's attempts to cobble together a disclosure of Mitek's claimed suture – by pulling words from 575 Patent claims to combine with description of an embodiment -- violates the axiom that, for a reference to anticipate, it must disclose all elements of the claims in the arrangement in which they are recited in the claims. *In re Chiang*, No. 94-1144, 1994 U.S. App. LEXIS 33214, *3 (Fed. Cir. Nov. 23, 1994) (Ex. C); *In re Bond*, 910 F.2d 831, 832 (Fed. Cir. 1990); *Carella*, 804 F.2d at 138. As the Federal Circuit has admonished, one cannot treat the claim as a “mere catalog of separate parts, in disregard of the part to part relationships set forth in the claims and that give the claims their meaning.” *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1458 (Fed. Cir. 1984). There is no disclosure in the 575 Patent of a suture having all of the elements, structural and compositional, recited in the 446 Patent claims, so there is no anticipation. Again, at the very least, there are issues of fact that preclude summary judgment.

3. There are Factual Issues Relating to Whether the 575 Patent Discloses a Sterilized Construction

The 446 Patent claims recite that the surgical suture is composed of “discrete yarns in a *sterilized*, braided construction” (Mitek Fact 194). Arthrex points to no disclosure in the 575 Patent that the disclosed products are sterilized. Rather, it cites to the disclosure of a *patent* that is cited in the Background section of the 575 Patent (Arthrex Br. at 23, n. 20). But it is textbook law that anticipation requires disclosure of each element of a claim in a *single reference*. *In re Chiang*, 1994 U.S. App. LEXIS at *3 (Ex. C); *In re Bond*, 910 F.2d at 832; *Carella*, 804 F.2d at 138. If Arthrex wants to take the position that sterilization is a requirement of the 446 Patent claims (as it has done, to try to argue that the inventors of the 446 Patent did not reduce their invention to practice before the filing date of the 575 Patent; *see* Section III.C.1 below), then it

certainly cannot take the position that the 575 Patent anticipates the 446 Patent claims when the 575 Patent makes no mention of any sterilization.

4. There are Factual Issues Relating to Whether the 575 Patent Discloses the Volume Fraction of Claim 9

Claim 9 of the 446 Patent recites that “the volume fraction of the first set of yarns in the braided sheath and core ranges from about 20 to about 80 percent” (Mitek Fact 195). Arthrex is wrong in alleging that Claim 9 is anticipated, not only for the reasons stated above, but also because the additional volume fraction limitation is not described in the 446 Patent.

Arthrex does not even try to allege that the 575 Patent makes any express disclosure of the recited volume fraction. And, as Dr. Hermes has opined, there is no such disclosure (Mitek Fact 196). Further, Arthrex fails to show that the recited volume fraction is inherently disclosed. It merely cites to an example in the 575 Patent of a spiroid braid that can be made up of two different materials (Arthrex Br. at 26) and, waving its hands, concludes that this is therefore a disclosure of a 20 to 80% volume fraction. But a braid could be made of two different materials in other volume fractions, as well. No one could conclude that the disclosure of any braid structure always and inevitably (*i.e.*, inherently) discloses a braid having a 20 to 80% volume fraction. *Glaxo Group Ltd. v. Apotex, Inc.*, 376 F.3d 1339, 1348 (Fed. Cir. 2004); *Continental Can*, 948 F.2d at 1268. Arthrex’s argument is based on unsupported, and unsupportable, attorney argument. There is no basis for granting summary judgment of invalidity of Claim 9.

C. Arthrex’s Invalidity Motion Should Be Denied Because There Are Factual Issues Regarding Whether the 575 Patent Is Even Prior Art

Arthrex’s motion should also be denied because there are factual issues regarding whether the 575 Patent even qualifies as prior art.

The application from which the 575 Patent issued was filed on February 3, 1992, just sixteen days before the filing date for the application on which the 446 Patent issued. Therefore,

the 575 Patent is only prior art under 35 U.S.C. §102(a) or (e) if the 446 inventors do not have a date of invention prior to the 575 Patent's filing date. *Mahurkar*, 79 F.3d at 1576.

The 446 Patent inventors have a date of invention prior to the filing of the 575 Patent if they either actually reduced the claimed invention to practice before the filing date of the 575 Patent or if they conceived of the invention before the filing date of the 575 Patent and were diligent in constructively reducing it to practice during the period from just before the filing date of the 575 Patent until the filing date for the 446 Patent. *Id.* at 1578. Here, there is proof that the inventors actually reduced the claimed invention to practice at least as early as 1989, and proof that the inventors conceived of the invention before the 575 Patent's filing date and were diligent in constructively reducing it to practice when they filed their application for the 446 Patent.

1. At The Very Least, There Are Questions Of Fact Regarding Whether The 446 Patent Was Actually Reduced To Practice

Arthrex admits that "the undisputed evidence in this case is that Ethicon, through its inventor, Dr. Steckel, built and tested heterogeneous braids in February 1989" (Arthrex Br. at 21). Of course, Arthrex could not say otherwise because Dr. Steckel testified, and his notebook confirms, that the idea was conceived of at least as early as June 1988, and that sutures were made and tested as least as early as February 1989 (Mitek Fact 197).

Arthrex does not dispute that the 446 Patent inventors actually built and tested sutures to show the proof of concept and that they would work for their intended purpose. Rather, Arthrex incorrectly contends that there was no actual reduction to practice, as a matter of law, because there is not evidence that the sutures were *sterilized*, and the claims recite sterile sutures (Arthrex

Br. at 21).¹⁴ But, even if the sutures which Dr. Steckel tested were not sterile, there was a reduction to practice in 1989 because Dr. Steckel's notebook and his testimony confirm that all of the testing was done to prove the concept of the invention and that it worked for its intended purpose (Mitek Fact 197). Under such circumstances, there was no need for Dr. Steckel to perform the routine sterilization step (Mitek Fact 198) to reduce his invention to practice.

For example, in *Mahurkar*, 79 F.3d at 1578-79, the Federal Circuit affirmed a JMOL decision that an allegedly invalidating reference was not prior art because no reasonable juror could have found that there was not a reduction to practice. In that case, the claim was for a medical catheter, and the claim recited, *inter alia*, that the catheter has a "blunt distal end [that would] prevent the distal end of the catheter from traumatizing or becoming caught in the walls of a vessel into which the catheter was inserted." *Id.* at 1575. The inventor, however, only built and tested "prototype[s]... in *his kitchen*," and he never proved this "preventing" claim limitation. *Id.* at 1578. According to the Federal Circuit, the inventor "adequately showed the reduction to practice." Likewise, here Dr. Steckel built and tested heterogeneous braids and tested them sufficiently to prove his invention.

It makes sense that Dr. Steckel may not have sterilized his sutures to prove the concept of his invention because sterilization is a well-known commercialization procedure (Mitek Fact 198). For example, Dr. Steckel built a suture having a braid of PET and PETFE (Mitek Fact 197). Dr. Mukerjee, Arthrex's expert, admits that sterilization of these materials was well-known at the time of the invention (Mitek Fact 199). Dr. Steckel would only have sterilized if he intended to use the sutures in human surgery or to commercialize the invention (Mitek Fact 200).

¹⁴ As noted above, this is inconsistent with Arthrex's wave-of-the-hand dismissal of any sterilization requirement in the claims when it comes to trying to find a disclosure of all claim elements in the 575 Patent.

But since he did not have to do that to prove the concept, and commercialization is not required for a reduction to practice, there was no need here to sterilize the sutures. *Loral Fairchild Corp. v. Matsushita Elec. Indus. Co.*, 266 F.3d 1358, 1362-63 (Fed. Cir 2001) (to show an actual reduction to practice all that needs to be shown is that the invention works for its intended purpose and “further efforts to commercialize the invention are simply not relevant”); *King Instruments. Corp. v. Otari Corp.*, 767 F.2d 853, 861 (Fed. Cir. 1985).

The evidence supports a finding that the 575 Patent is not available as prior art because the invention of the 446 Patent was reduced to practice before the 575 Patent filing date. At the very least, there are genuine issues of material fact, with respect to whether the 575 Patent is available as prior art, that preclude summary judgment of invalidity.

2. There Are Factual Issues Regarding Whether the 446 Patent Was Constructively Reduced to Practice

Even if the Court were to disagree that the inventors reduced the invention of the 446 Patent to practice before the 575 Patent filing date, there is another reason why the 575 Patent does not qualify as prior art. It is not prior art because the evidence shows that the inventors conceived their invention before the 575 Patent filing date and, subsequent to that filing date, were diligent until they (constructively) reduced their invention to practice.

The 446 Patent inventors conceived of the invention at least as early as June 1988 (Mitek Fact 213). Further, the invention was constructively reduced to practice when the application for the 446 Patent was filed on February 19, 1992 (Mitek Fact 214). *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1377-78 (Fed. Cir. 1986). Thus, Mitek need only show reasonable diligence for seventeen days, from just before February 3, 1992 (the 575 Patent filing date) until February 19, 1992 (the 464 Patent filing date), to remove the 575 Patent as prior art. *Makurkar*, 79 F.3d at 1577-78.

Here, there is more than sufficient evidence from which the jury could find reasonable diligence. For example, a memorandum from Mr. Goodwin, the attorney who prepared the application, and Dr. Steckel's testimony show that a draft application was sent to the inventors at least as early as January 1992 (Mitek Fact 202). Also, Dr. Steckel's testimony and Mr. Goodwin's memorandum show that Mr. Goodwin had exercised reasonable diligence to finalize the application by trying to obtain comments from Dr. Steckel and contacting his supervisor when Dr. Steckel did not respond while he was in the process of moving from New Jersey to Ohio in January 1992 (Mitek Fact 203). Dr. Steckel's testimony further shows that he reviewed at least two draft applications, had email communications and discussions with counsel before the application for the 446 was filed, collected comments from the inventors, and finalized the application after completing his January move from New Jersey to Ohio in February 1992 (Mitek Fact 204).

Under these facts, a reasonable jury could conclude that there was conception in June 1998, reasonable diligence from at least before February 3, 1992 to the February 19, 1992 construction reduction to practice date. Again, at the very least, there are genuine issues of material fact, with respect to whether the 575 Patent is available as prior art, that preclude summary judgment of invalidity.

D. The Issue of Whether the 446 Patent Claims Are Anticipated By the 575 Patent Disclosure Cannot be Disposed of on Summary Judgment

In summary, Arthrex has not met its burden of establishing that it is entitled to judgment as a matter of law that claims of the 446 Patent are invalid, as anticipated by the 575 Patent. At the very least, there are genuine issues of fact precluding summary judgment, including what the 575 Patent discloses and whether it even qualifies as prior art against the 446 Patent.

IV. Conclusion

For the reasons presented above, Arthrex's motions for summary judgment of noninfringement and invalidity should be denied.

Dated: September 1, 2006

DEPUY MITEK, INC.,

By its attorneys,

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CERTIFICATE OF SERVICE

I certify that I am counsel for DePuy Mitek, Inc. and that true and correct copies of:

DePuy Mitek's Memorandum in Opposition to Arthrex's Motion for Summary Judgment; and

DePuy Mitek's Response to Defendants Arthrex, Inc.'s and Pearsalls, Ltd.'s Concise Statement of Material Facts in Support of Their

were served on counsel for Defendants Arthrex, Inc. and Pearsalls Ltd. on this date via the Court's e-mail notification with the following recipients being listed as filing users for Defendants:

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LEXSEE 1998 US DIST LEXIS 23054

BASF CORPORATION, Plaintiff, v. EASTMAN CHEMICAL CO., Defendant.**Civil Action No. 95-746-RRM****UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE***1998 U.S. Dist. LEXIS 23054; 56 U.S.P.Q.2D (BNA) 1396***March 24, 1998, Decided****CASE SUMMARY:**

PROCEDURAL POSTURE: Plaintiff patent holder commenced a patent infringement action against defendant competitor. The competitor counterclaimed for a declaratory judgment of noninfringement and invalidity. The court held a non-jury trial on the issues of infringement, willful infringement, and invalidity.

OVERVIEW: The holder asserted that a process used by the competitor to prepare 2,5-dihydrofuran from the chemical epoxy 1 butene infringed a claim made by its patent. The court found in favor of the competitor. The scope of a patent claim was defined by its language. While a court was permitted to consider the prosecution history and the like in its interpretation, reliance on such extrinsic evidence was improper when the language unambiguously defined a claim's scope. Given those considerations, the holder's claim excluded the addition of a solubilizer, as that component would alter its basic and novel characteristics. Furthermore, the claim only provided that the catalysis had to occur in a liquid phase and did not exclude gas feed processes. Therefore, the competitor's process did not infringe the holder's claim. Moreover, that claim was invalid because every one of its elements had been reduced prior to the priority date of the holder's application. In that regard, the delay between that reduction and the competitor's patent application was not evidence of abandonment or concealment because scientists were entitled to a reasonable amount of time in which to refine their invention.

OUTCOME: The court found that the competitor had not infringed one of the claims contained in the holder's patent. The court further held that claim was invalid on the grounds of priority of invention and that the competitor had not abandoned, suppressed, or concealed the invalidating prior reductions to practice.

LexisNexis(R) Headnotes

Patent Law > Infringement Actions > Claim Interpretation > General Overview

[HN1] Before a court can decide issues such as infringement, willful infringement, and invalidity, the court must first construe the language of a claim made by a patent.

Patent Law > Claims & Specifications > Enablement Requirement > General Overview

Patent Law > Infringement Actions > Claim Interpretation > General Overview

[HN2] A court construes claims from the vantage point of a person of ordinary skill in the art at the time of the invention. However, the court may interpret a term in a patent claim to have a meaning other than the one a person of ordinary skill in the art would give it if it is apparent from the patent and the prosecution history that the inventor intended a different meaning.

Patent Law > Infringement Actions > Claim Interpretation > General Overview

[HN3] In construing a claim, a court looks first to the intrinsic evidence of record, namely, the language of the claim, the specification, and the prosecution history. The claim language itself defines the scope of the claim, and a construing court does not accord the specification, prosecution history, and other relevant evidence the same weight as the claims themselves, but consults these sources to give the necessary context to the claim language. Expert testimony may be considered if needed to assist the court in understanding the meaning or scope of technical terms in a claim. However, reliance on any extrinsic evidence is improper where the claims, specification, and file history unambiguously define the scope of the claim.

Patent Law > Infringement Actions > Claim Interpretation > General Overview

[HN4] Although the Court of Appeals for the Federal Circuit has held that claims should be read in light of the specification, that court has repeatedly cautioned against limiting the scope of a claim to the preferred embodiment or specific examples disclosed in the specification.

Patent Law > Infringement Actions > Claim Interpretation > General Overview

[HN5] The Court of Appeals for the Federal Circuit has stated that the limited phrase "consisting essentially of" does not exclude the addition of another ingredient which does not materially affect the characteristics of the invention. The Federal Circuit has also stated that "consists essentially of" does close the claims to other ingredients that do alter the basic and novel characteristics of the invention.

International Trade Law > Imports & Exports > General Overview***Patent Law > Infringement Actions > Infringing Acts > Sale******Patent Law > Infringement Actions > Infringing Acts > Use***

[HN6] Section 271(a) of the Patent Act states that whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent therefor, infringes the patent. 35 U.S.C.S. § 271(a).

Patent Law > Date of Invention & Priority > Abandonment, Concealment & Resumption of Activity***Patent Law > Date of Invention & Priority > Conception Date******Patent Law > Date of Invention & Priority > Reduction to Practice***

[HN7] Section 102(g) of the Patent Act, 35 U.S.C.S. § 102(g), provides that a person is entitled to a patent unless before the application's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

Evidence > Procedural Considerations > Burdens of Proof > Clear & Convincing Proof***Patent Law > Infringement Actions > Burdens of Proof
Patent Law > Infringement Actions > Defenses > Patent Invalidity > Validity Presumption***

[HN8] A claim contained in a patent is presumed to be valid. 35 U.S.C.S. § 282. The challenging party bears the burden of proving invalidity by clear and convincing evidence. Clear and convincing evidence is shown when the trier of fact has an abiding conviction that the truth of the factual contentions is highly probable.

Patent Law > Anticipation & Novelty > General Overview***Patent Law > Date of Invention & Priority > Reduction to Practice***

[HN9] To show prior reduction to practice, a party must show that its work meets every element of the claimed invention before the priority date of a patent application.

Patent Law > Anticipation & Novelty > General Overview

[HN10] There cannot be a reduction to practice of the invention without a physical embodiment which includes all limitations of the claim.

Patent Law > Anticipation & Novelty > General Overview***Patent Law > Statutory Bars > Abandonment & Forfeiture Bar > General Overview***

[HN11] In order to show that it did not abandon, suppress, or conceal experiments within the scope of a claim, a party must show that it disclosed the process of the claim in a manner that would bring the benefit of the knowledge of the invention to the public, and that it did not unreasonably delay this disclosure.

Patent Law > Anticipation & Novelty > General Overview***Patent Law > Date of Invention & Priority > Abandonment, Concealment & Resumption of Activity******Patent Law > Statutory Bars > Abandonment & Forfeiture Bar > General Overview***

[HN12] It is necessary to consider the nature and extent of activity during the period between reduction to practice and the filing of the patent application.

Patent Law > Anticipation & Novelty > General Overview

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Patent Law > Date of Invention & Priority > Abandonment, Concealment & Resumption of Activity
Patent Law > U.S. Patent & Trademark Office Proceedings > Continuation Applications > Priority

[HN13] The Court of Appeals for the Federal Circuit has stated that when determining whether an inventor has abandoned, suppressed, or concealed an invention, a period of delay between completion of the invention and subsequent public disclosure is not always of legal significance.

Patent Law > Anticipation & Novelty > General Overview

Patent Law > Date of Invention & Priority > Abandonment, Concealment & Resumption of Activity
Patent Law > Statutory Bars > Abandonment & Forfeiture Bar > General Overview

[HN14] Mere delay, without more, is insufficient to demonstrate abandonment, suppression, or concealment.

Patent Law > Anticipation & Novelty > General Overview

Patent Law > Jurisdiction & Review > Subject Matter Jurisdiction > Appeals

Patent Law > Ownership > Conveyances > Assignments
 [HN15] Scientists should be given a reasonable amount of time to refine their invention. A reasonable amount of time should be allowed for completion of the research project on the whole series of new compounds, a further reasonable period should then be allowed for drafting and filing the patent application(s) thereon, without subjecting the prior inventor or his assignee to the risk of forfeiture of valuable patent rights due to alleged concealment or suppression of the invention.

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JUDGES: Roderick McKelvie, District Judge.

OPINIONBY: Roderick McKelvie

OPINION:

REVISED MEMORANDUM OPINION

Dated: March 24, 1998

McKELVIE, District Judge

This is a patent case. Plaintiff BASF Corporation ("BASF") owns U.S. Patent No. 5,034,545 ("the '545 [*2] patent"), which claims a process for the preparation of the chemical 2,5-dihydrofuran ("DHF") from the chemical epoxy 1 butene ("EpB"). BASF alleges that defendant Eastman Chemical Co.'s ("Eastman") process for the commercial production of DHF infringes claim 6 of the '545 patent, and that Eastman is wilfully infringing. Eastman has denied infringement, asserted the affirmative defense of invalidity on the grounds of priority of invention, and counterclaimed for a declaratory judgment of noninfringement and invalidity.

From October 14 to October 22, 1997, the court held a non-jury trial on the issues of infringement, willful infringement, and invalidity. At trial, BASF alleged that the process Eastman is using at its Longview, Texas plant to commercially prepare DHF infringes claim 6 of the '545 patent, and that Eastman is wilfully infringing claim 6. Eastman argues that it is not infringing claim 6 of the '545 patent, as the process it uses in Longview is not covered by claim 6. Furthermore, Eastman argues that claim 6 of the '545 patent is invalid on the grounds of priority of invention because experiments done by Eastman scientists before BASF filed the '545 patent application [*3] constitute prior reductions to practice of claim 6, and Eastman scientists disclosed the results of these experiments in a patent application filed in March 1990.

The following is the court's decision on these issues.

I. FACTUAL AND PROCEDURAL BACKGROUND

The court draws the following facts from the pre-trial order and from the evidence presented at the trial.

A. The Technology

The technology at issue in this matter involves the preparation of DHF from EpB. DHF is a solvent and starting material that can be used to make products such as Spandex and other products in the plastics industry. EpB is a compound with negligible commercial value. Through a chemical process known as catalysis, EpB can be transformed to DHF. Catalysis is the action of a catalyst, a substance which alters the rate of a chemical reaction without being depleted in the process. The catalyst creates a reaction that rearranges the manner in which the atoms that make up EpB are bound together, without altering the number of atoms. Because EpB can create end products other than DHF, the catalyst used for this rearrangement is critical to the process.

Scientists have explored many different methods [*4] for the catalytic rearrangement of EpB to DHF. In January 1976, the Patent and Trademark Office ("PTO") issued U.S. Patent No. 3,932,468 ("the Kurkov patent") to the Chevron Research Company. The Kurkov patent discloses a process for producing DHF using a catalyst of "hydrogen iodide or bromide and a homogenous transition metal compound in an organic solvent." In December 1976, the PTO issued U.S. Patent No. 3,996,248 ("the Wall patent") to Chevron. The Wall patent discloses a process for producing DHF using a catalyst of "hydrogen halide selected from the group consisting of hydrogen iodide or bromide and a Lewis acid."

Both processes claimed by the Kurkov and the Wall patents are solvent-based. One significant disadvantage of solvent-based processes is the need to remove the DHF from the reaction mixture through a distillation process. Distillation constitutes a separate step of the recovery process, and renders the process less efficient and less economical. Thus, during the 1980's, scientists at BASF and Eastman sought to create alternative catalyst systems for converting EpB to DHF without the disadvantages associated with the use of large amounts of solvent. The dates on which [*5] these scientists discovered and reduced to practice certain catalyst systems is integral to the dispute between BASF and Eastman.

B. The '545 Patent

On May 23, 1990, BASF Aktiengesellschaft ("BASF AG"), a German corporation, filed a patent application with the PTO, which matured into the '545 patent. The PTO issued the '545 patent on July 23, 1991. Martin Fischer, the named inventor, assigned the '545 patent to BASF AG, which subsequently assigned it to BASF.

In August 1989, approximately one year before filing the '545 patent application, BASF AG filed an application in Germany. The '545 patent application claimed

priority to the German application, which means that the '545 patent application received the benefit of the earlier filing date of August 8, 1989. See 35 U.S.C. § 119 (1997).

The '545 patent teaches that the catalytic rearrangement of EpB can occur using a three part catalyst system at a temperature between 60 [degrees] and 200 [degrees] Celcius. This catalyst system includes component A, which "is a halide of an alkali metal or alkaline earth metal or an onium halide." Component A is the active ingredient that starts the reaction [*6] with the EpB. Component B dissolves component A so that it can mix with the liquid solution during catalysis. Component B "is an organic solubilizer for component A." Component C "is a Lewis acid or elemental iodine."

The original application for the '545 patent included five claims. Claim 1 of the patent claimed a process for the preparation of DHF from EpB which

comprises the rearrangement being catalyzed by a system which contains components A, B and C, at from 60 [degrees] to 200 [degrees] C., where

A is a halide of an alkali metal or alkaline earth metal or an onium halide,

B is an organic solubilizer for component A, and

C is a Lewis acid or elemental iodine, with the proviso that at least one of components A or C is an iodide.

Claims 2 to 5 depended from claim 1.

The original application for the '545 patent included a discussion of the amount of component B necessary to dissolve component A. As noted in the patent application, "the amount of solubilizer B required to solubilize component A greatly depends on the particular substance." The patent application also noted that onium halides, which may be used as component A, have a "certain intrinsic solubility [*7] in the organic reaction medium." Accordingly, the solubility of the "onium halides with four alkyl or aryl substituents may be so great in the reaction medium that virtually no addition of solubilizer B is necessary." This language, which constituted part of the original application filed with the PTO, is included at column 4, lines 36 to 58 of the '545 patent.

On November 6, 1990, during the prosecution of the '545 patent, the patent examiner relied on the language in the patent specification, and noted that solubilizer may

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not be necessary when certain halides are used as component A. The examiner noted that "this 'no solubilizer' embodiment is intended to be covered by the claims." Thus, the examiner suggested what eventually became claim 6 of the '545 patent.

On January 24, 1991, BASF AG added amended claim 6 to the '545 patent. Claim 6 limits component A to onium halides that are "substantially soluble in the reaction medium." Claim 6 claims a process for the preparation of DHF from EpB which

consists essentially of the rearrangement being catalyzed by a system which contains components A and C from 60 [degrees] to 200 [degrees] C where A is an onium halide, which [*8] is substantially soluble in the reaction medium, and C is a Lewis acid or elemental iodine with the proviso that at least one of the components A or C is an iodide.

C. Eastman's Catalytic Rearrangement

In the 1980's, Eastman scientists were also experimenting with different catalyst systems for converting EpB to DHF. In particular, three scientists focused their studies on the catalytic rearrangement of EpB Dr. Stephen Falling, Dr. John Monnier, and Dr. Howard Low.

In January 1987, Monnier notified Dr. Windell Watkins that he had discovered a process for cheaply manufacturing EpB from butadiene. Watkins invited Monnier to come from Eastman's Rochester, New York plant, to its Longview, Texas plant to give a seminar on his research on converting butadiene to EpB. On February 24, 1987, Watkins wrote a memo to Monnier and Steve Godleski, another research scientist at Rochester, indicating an interest in working with scientists at the Rochester plant to "develop a process for epoxy-butene and . . . to develop some other chemicals that are easily derived from EpB."

As a result of Watkins' memo, in December 1987, Eastman scientists held a meeting at the Rochester plant to discuss [*9] whether to convene a team to develop a process for preparing EpB and EpB derivatives. Following the meeting, the scientists created an EpB team comprised of, among others, Watkins, Godleski, Monnier, Low, and Falling. Watkins headed the EpB team. Although the scientists did not all work at the same Eastman plant, they kept one another informed of the results of their experiments. For example, beginning in the summer of 1988 and continuing through the end of 1990, Falling circulated monthly reports to other members of

the EpB team documenting the progress of his experiments.

1. Falling's, Monnier's, and Low's experiments

In June 1988, Falling began to explore different processes for catalytically rearranging EpB to DHF. Falling's experiments always included EpB in liquid form. At trial, Falling testified about some of the experiments he conducted.

On June 9, 1988, Falling catalytically rearranged EpB to DHF by mixing a Lewis Acid (zinc chloride), an onium halide (tetrabutylammonium iodide), a solvent (toluene), and EpB at 100 [degrees] C, resulting in 4.4% DHF. On June 15, 1988, Falling mixed a Lewis acid (zinc chloride), an onium halide (tetrabutylammonium iodide), a solvent [*10] (toluene), and EpB at 150 [degrees] C. The end product was 21.2% DHF.

On June 28, 1988, Falling attempted an experiment with a different Lewis acid (zinc iodide), an onium halide (tetrabutylammonium iodide), a solvent (toluene) and EpB at 150 [degrees] C. Two days later, Falling ran a similar experiment, using dioxane instead of toluene. The result was 92.3% DHF. At trial, Falling noted that "this experiment was very successful. It showed even greater amounts of DHF" than the prior experiments.

On July 6, 1988, Falling conducted a "neat" experiment. An experiment is neat when neither solubilizer nor solvent is added. Falling obtained DHF by mixing EpB with only a Lewis acid (zinc iodide) and an onium halide (tetrabutylammonium iodide) at 66 [degrees] to 70 [degrees] C. This catalyst combination produced 71.2% DHF. Two days later, on July 8, 1988, in a monthly report from Falling to Watkins and other members of the EpB team, Falling reported that the "best catalyst system studied thus far is [zinc iodide / tetrabutylammonium iodide,]" which included the neat experiment, and the earlier experiment with dioxane. Falling also reported that "runs without solvent or in dioxane [*11] have been the most encouraging with regard to DHF/crotonaldehyde ratios. These runs appear to be clean and go to complete conversion of EpB."

Falling continued to experiment with various Lewis acids, onium halides, and solvents to obtain DHF. Falling also conducted more neat experiments. On July 18, 1988, Falling conducted a neat experiment, using tetrabutyltin iodide and tetrabutylphosphonium iodide at 66 [degrees] to 70 [degrees] C. Only trace amounts of DHF were detected, and Falling discarded the experiment. Falling concluded that "some reaction had occurred" and that "these conditions were not optimum for this particular reaction." On July 27, 1988, Falling conducted another neat experiment, using magnesium iodide and tetrabutylammonium iodide at 66 [degrees] to 70 [degrees] C,

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resulting in a trace amount of DHF. Falling discarded this experiment. Falling testified at trial that 66 [degrees] to 70 [degrees] C is "just too low a temperature to achieve very much reaction," and that if he had run the experiment at a higher temperature, he predicted that he "would obtain much more reaction."

On October 3, 1988, Falling successfully produced 71.7% DHF when he mixed a [*12] Lewis acid (tributyltin iodide), an onium halide (tetrabutylphosphonium iodide), and a solvent (toluene), at 150 [degrees] C.

In most of the above experiments, except the neat experiments, Falling used a solvent. At trial, Falling testified that he used toluene as the solvent because EpB was in short supply and he had to conserve it, and "toluene had the purpose of diluting the mixture so as to cut down polymerization chemistry and to favor the rearrangement reaction."

Falling continued to experiment with various catalyst combinations throughout 1989 and 1990, circulating monthly reports documenting his progress. In an August 1, 1989 memo sent to members of the EpB team Falling wrote that "the screening of catalyst systems for the homogenous rearrangement of EpB to 2,5-DHF is still in progress."

At the same time that Falling worked on developing a process for converting EpB to DHF, Monnier and Low were also experimenting with various catalysts. Because of the equipment capabilities at the Rochester plant, all of their experiments were gas feed, which meant that they used EpB in gas form.

Monnier and Low testified at trial that they initially used metallic iodides as a catalyst. [*13] However, Watkins thought that Falling's use of an onium halide and a Lewis acid as a catalyst constituted a major breakthrough for converting EpB to DHF. Thus, from November 1988, to January 1990, Monnier and Low conducted several experiments using this catalyst to rearrange EpB to DHF. The experiments were run at approximately 110 [degrees] to 185 [degrees] C. Low testified that the conversion to DHF was "pretty successful" when they used onium halides and a Lewis acid.

2. The patent applications

On March 8, 1990, Eastman filed U.S. Patent Application Serial No. 07/490,208 ("the '208 application") which claimed a process for the catalytic rearrangement of EpB to DHF by mixing a Lewis acid and an onium halide. This process used neither a solubilizer nor a solvent at a temperature range of 60 [degrees] to 225 [degrees]. The '208 application was mainly based on the gas feed, liquid phase catalyst work done by Monnier and Low. Although the '208 application generally covered Falling's work, it did not include any working examples

from Falling's notebooks, and Falling was not listed as an inventor on the application. Eastman filed the '208 application approximately two and [*14] a half months before BASF filed the '545 application.

On July 23, 1990, Falling and Patricia Lopez-Maldonado, a scientist working with Falling since July 1989, completed an invention report and submitted it to Eastman's patent department. The report stated that "[a] catalytic process has been discovered with the rearrangement of vinyl epoxides to 2,5-dihydrofurans in good yield and selectivity. The process comprises contacting a vinyl epoxide [EpB] with a catalytic amount of an organotin or organoantimony compound and an organic-soluble iodide or bromide salt in an inert solvent at elevated temperatures." Organotins or organoantimony compounds are Lewis acids.

The report also stated that the "process is an improvement over the prior art in that it does not require the use of corrosive hydrogen halides or expensive tertiary amide solvents." The report stated that "although the rearrangement reaction can be performed in the absence of solvent, the use of an inert organic solvent or diluent is normally preferred for ease of materials handling. The vinyl epoxide rearrangement can be performed in any solvent which is unreactive towards epoxides and the catalysts."

This invention [*15] report became the basis for a December 14, 1990 addendum to the '208 application, a continuation in part ("CIP"). The CIP added to the '208 application working examples of the liquid phase experiments using a catalyst system of an onium halide and a Lewis acid that Falling had worked on during the summer of 1988. Because the CIP contained some new subject matter, the new subject matter had its own filing date of December 14, 1990.

Eastman filed the CIP as a new patent application, U.S. Application Serial No. 627,668 ("the '668 application"). The '668 application disclosed a process for converting EpB to DHF using a catalyst of an onium halide and a Lewis acid, and no solubilizer. Eastman eventually abandoned the '208 application in favor of the '668 application. The '668 application matured into U.S. Patent No. 5,082,956 ("the '956 patent"), which the PTO issued to Eastman on January 21, 1992. Monnier, Godleski, Low, and Gerald W. Phillips, a scientist at the Longview plant, are listed as inventors. The '956 patent discloses a process for converting EpB to DHF where the "catalyst may comprise a supported catalyst, an unsupported catalyst or a solution of the catalytically-active components [*16] in an inert, organic solvent."

During the early to mid-1990's, Eastman filed other patent applications as Eastman scientists continued experimenting with processes for catalytically rearranging

EpB into DHF. On February 10, 1994, Eastman filed U.S. Application Serial No. 08/194,655 ("the '655 application"), which claims a process for the catalytic rearrangement of EpB to DHF using a catalyst system of an onium halide and a Lewis acid. Falling is listed as the inventor on the '655 application.

The '655 application is a continuation in part of Application Serial No. 07/746,530, which was filed in August 1991, and which is a divisional application of the '668 application. The divisional application is based on the parent application, the '668 application, and it has the same specifications but different claims. The divisional application is entitled to the filing date for the '668 application, December 14, 1990. The '655 application is still pending.

On May 24, 1994, the PTO issued U.S. Patent No. 5,315,019 ("the '019 patent") to Eastman. Phillips, Falling, Monnier, and Godleski are listed as the inventors. The '019 patent discloses a "continuous process for the manufacture of [DHF] [*17] by the isomerization of [EpB] in the liquid phase in the presence of a catalyst system comprising an onium iodide compound and a Lewis acid and a process solvent comprising a mixture of the [DHF] product of the process and an oligomer of the [EpB] reactant." Thus, the '019 patent discloses a process in which the onium halides are intrinsically soluble in the reaction medium, which essentially eliminates the need for added solvent.

At column 2, line 60, to column 3, line 3, the '019 patent states that the "advantages provided by the continuous process disclosed herein include milder reaction conditions, simplified product separation and the ability to remove and replenish the catalyst system." Additionally, the "use of a mixture of the [DHF] product and an oligomer of the [EpB] reactant as the inert process solvent allows the reaction to be run at temperatures substantially lower than those used in vapor phase processes," and "as a result, the potential for catalyst deactivation or decomposition and by-product formation is decreased."

D. The Interference

On November 3, 1994, the PTO declared an interference between claims 1 to 6 of BASF's '545 patent and Eastman's pending [*18] '655 application. (Monnier et al. v. Martin Fischer, Interference No. 103,455). The PTO declared the interference for the purpose of determining whether BASF or Eastman first catalytically rearranged EpB to DHF using a catalyst system of an onium halide and a Lewis acid.

On November 29, 1995, Administrative Patent Judge Marc L. Caroff declared unpatentable claims 1 to 5 of the '545 patent because example 6 of the Wall patent

disclosed a process for the preparation of DHF from EpB using a catalyst system that anticipated claims 1 to 5. Judge Caroff also determined that claim 6 of the '545 patent is directed to the same invention Eastman claims, and that if Eastman's application matures into a patent, claim 6 of the '545 patent will be declared invalid on the basis of Eastman's priority of invention.

The interference proceedings are still pending.

E. The Longview Process

Eastman is currently working on a method for commercially producing DHF from its plant in Longview, Texas. At Longview, Eastman commences the process of catalytically rearranging EpB to DHF using a specific onium halide, THF (tetrahydrofuran), which is a solubilizer, and a specific Lewis acid, at 70 [degrees] [*19] to 117 [degrees] C. Gerald Butler, a chemical engineer at Eastman, testified at trial about the Longview process.

At start-up, there is a one-to-one ratio of the onium halide to THF. The THF is added to the EpB to help dissolve the onium halide. Within six to twelve hours of adding both products distillation begins, and shortly thereafter a large portion of the THF is removed. The DHF produced soon outweighs the THF, and THF becomes less important to carry out the reaction. Eventually, no THF is left in the system.

When the EpB is added to the mixture of onium halide, THF, and Lewis acid, and DHF is produced, approximately 3% of the EpB is converted to oligomer. Eastman's expert in organic chemistry, Dr. John Swenton, testified at trial that the textbook definition of oligomer is a "substance composed of molecules containing a few of one or more species of atoms or groups of atoms . . . repetitively linked to each other." As the DHF is produced, it is stored separately, and the oligomer is recycled back into the system to convert EpB to DHF. The oligomer is eventually built up to where it constitutes a substantial proportion of the system. The oligomer replaces the solubilizing [*20] function of the THF at start-up and helps keep the onium halide in a liquid state. The oligomer is inherently produced during the reaction. By recycling the oligomer back into the process to act as a solubilizer, the process can be run for months at a time.

F. The Lawsuit

On December 7, 1995, BASF filed a complaint alleging that the Longview process infringes claim 6 of the '545 patent, and that Eastman is wilfully infringing. On January 12, 1996, Eastman filed an answer denying infringement, asserting the affirmative defense of invalidity on the grounds of priority of invention, and counterclaiming for a declaratory judgment of noninfringement and invalidity.

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On April 15, 1997, Eastman filed a motion for leave to amend its answer and counterclaim and to add BASF AG as a party. Eastman sought to add several affirmative defenses, including the affirmative defenses of fraud, inequitable conduct, and unclean hands. Eastman also sought to add additional counterclaims, including a counterclaim for unfair competition pursuant to Delaware common law and statutory law, and counterclaims for a declaratory judgment that the '545 patent is unenforceable because of inequitable conduct, [*21] and that BASF is guilty of unclean hands. On July 31, 1997, the court granted Eastman's motion.

From October 14 to October 22, 1997, the court held a non-jury trial on the issues of infringement, willful infringement, and invalidity. At trial, BASF argued that the "virtually solvent-free process" which Eastman uses at Longview infringes claim 6 of the '545 patent. Furthermore, BASF argued that Eastman knew about the '545 patent before it commenced the production of DHF at Longview. Eastman argued that the Longview process does not infringe because of the use of a solubilizer, THF, at start-up, and the continuous use of a solubilizer, recycled oligomer, throughout the process. Furthermore, Eastman argued that Falling's neat experiments and his experiments using toluene as an inert solvent, and the gas feed work of Monnier and Low establish priority of invention. Therefore, Eastman argued that claim 6 of the '545 patent is invalid. See 35 U.S.C. § 102(g) (1997). BASF argued that if these experiments establish prior inventorship, claim 6 is not invalid because Eastman abandoned, suppressed, or concealed this work.

On November 24, 1997, the parties stipulated [*22] that resolution of all other issues would be stayed pending the court's decision on infringement, willful infringement, and invalidity.

II. DISCUSSION

[HN1] Before the court can decide the issues of infringement, willful infringement, and invalidity, the court must first construe the language of claim 6 of BASF's '545 patent.

A. Claim Construction

[HN2] The court construes claims from the vantage point of a person of ordinary skill in the art at the time of the invention. See *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 986 (Fed. Cir. 1995) (en banc), aff'd, 517 U.S. 370, 116 S. Ct. 1384, 134 L. Ed. 2d 577 (1996). However, the court may interpret a term in a patent claim to have a meaning other than the one a person of ordinary skill in the art would give it if it is apparent from the patent and the prosecution history that the inventor intended a different meaning. See *Hoechst Celanese Corp. v. BP Chems. Ltd.*, 78 F.3d 1575, 1579 (Fed. Cir.), cert.

denied, 519 U.S. 911, 117 S. Ct. 275, 136 L. Ed. 2d 198 (1996).

[HN3] In construing a claim, the court looks first to the intrinsic evidence of record, namely, [*23] the language of the claim, the specification, and the prosecution history. See *Instituform Tech. Inc. v. Cat Contracting, Inc.*, 99 F.3d 1098, 1105 (Fed. Cir. 1996). The claim language itself defines the scope of the claim, and "a construing court does not accord the specification, prosecution history, and other relevant evidence the same weight as the claims themselves, but consults these sources to give the necessary context to the claim language." *Eastman Kodak Co. v. Goodyear Tire & Rubber Co.*, 114 F.3d 1547, 1552 (Fed. Cir. 1997). Expert testimony may be considered if needed to assist the court in understanding the meaning or scope of technical terms in a claim. See *Hoechst*, 78 F.3d at 1579. However, reliance on any extrinsic evidence is improper where the claims, specification, and file history unambiguously define the scope of the claim. See *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996).

[HN4] Although the Court of Appeals for the Federal Circuit has held that claims should be read in light of the specification, *id.* at 1582, the court has repeatedly cautioned against limiting [*24] the scope of a claim to the preferred embodiment or specific examples disclosed in the specification. See e.g., *Ekchian v. Home Depot, Inc.*, 104 F.3d 1299, 1303 (Fed. Cir. 1997); see also *Intervet America, Inc. v. Kee-Vet Laboratories, Inc.*, 887 F.2d 1050, 1053 (Fed. Cir. 1989) (explaining that it is "improper" to read an extraneous limitation from the specification into the claim).

Claim 6 of BASF's '545 patent is the only claim at issue in this case. Claim 6 claims a process for the catalytic rearrangement of EpB to DHF

which consists essentially of the rearrangement being catalyzed by a system which contains components A and C from 60 [degrees] to 200 [degrees] C where A is an onium halide, which is substantially soluble in the reaction medium, and C is a Lewis acid or elemental iodine with the proviso that at least one of the components A or C is an iodide.

BASF and Eastman dispute the meaning of two phrases of claim 6. They dispute the meaning of "consists essentially of," and "substantially soluble in the reaction medium."

1. What Does "Consists Essentially Of" Mean?

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BASF argues that the phrase "consists essentially of" [*25] means virtually solvent free, and therefore, a small amount of component B, solvent or solubilizer, can be present in the reaction. Eastman argues that "consists essentially of" precludes the use of component B, solubilizers.

BASF argues that the terms solvent and solubilizer are synonymous, that component B includes both terms, and that claim 6 permits the addition of small amounts of either. Eastman distinguishes between the terms, arguing that solvents and solubilizers perform different functions, that component B encompasses solubilizers only, and that claim 6 excludes the addition of component B. Accordingly, before the court construes whether the phrase "consists essentially of" permits the addition of component B, the court must determine whether component B includes both solvents and solubilizers.

The patent describes component B as an organic solubilizer. At column 2, lines 61 to 66, the patent specification explains that because the only requirements that component B has to meet are "bringing about the dissolution of component A and otherwise being stable and inert under the reaction conditions, a large number of substances can be used as component B." Column 2, line 66 [*26] to column 3, line 50 of the '545 patent gives examples of solubilizers that can be used in the catalyst system, including dioxane, tetrahydrofuran, and certain podands. Thus, the patent defines a solubilizer as an element which dissolves component A.

Column 3, line 68, of the patent discusses certain inert solvents, explaining that specific solvents can be used "for diluting the reaction mixture." The patent specification also gives examples of solvents that can be used for this purpose, including toluene and xylene. Thus, the patent defines a solvent as an element which dilutes the reaction mixture. Accordingly, the patent distinguishes between solubilizers and solvents, teaching that a solubilizer makes component A more soluble in the reaction medium, while a solvent dilutes the reaction medium.

Furthermore, during the prosecution of the '545 patent, BASF's patent attorney specifically distinguished between solubilizers and solvents, emphasizing that "organic solubilizers" are distinct from solvents. The attorney wrote to the PTO:

The term "organic solubilizer" is also carefully defined by the Fischer ['545] specification as being 'complexing agents for the salts A' or [*27] closely equivalent complexing solvents. This "organic solubilizer" is not an "inert solvent" such as those listed in col. 3, lines 64-68, in-

cluding xylene and toluene, etc. Fischer makes it quite clear that such "inert solvents" are not suitable as an organic solubilizer but may be optionally added as a diluent.

Thus, the court concludes that solvents and solubilizers have distinct meanings and that component B, an "organic solubilizer," includes solubilizers only.

The court must now determine what the phrase "consists essentially of" means, and whether it permits the addition of component B. The phrase "consists essentially of" is not unique to the '545 patent. [HN5] The Federal Circuit has stated that the "limited phrase 'consisting essentially of' does not 'exclude the addition of another ingredient which does not materially affect the characteristics of the invention.'" *Water Techs. Corp. v. Calco, Ltd.*, 850 F.2d 660, 666 (Fed. Cir. 1988). The Federal Circuit has also stated that "consists essentially of" does "close the claims to other ingredients that do alter the basic and novel characteristics of the invention." *Neville Chem. Co. v. Resinall Corp.*, 915 F.2d 1584, 1990 WL 135903, [*28] at *1 (Fed. Cir. 1990).

The '545 patent originally included six claims. Claims 1 to 5 all included component B, an organic solubilizer, as an essential element of the catalyst system. Component B's role in the catalyst system was to bring component A into solution. Claim 6, however, covered a catalyst system in which component A, an onium halide, is "substantially soluble," thereby eliminating the need for an organic solubilizer. The patent specification refers to onium halides as having an "intrinsic solubility." If something is intrinsically soluble, it is inherently capable of dissolving and does not need an additional component to put it into solution. Because the court defines solubilizer as an element that makes component A soluble, it follows that something that is intrinsically soluble does not need a solubilizer to help it dissolve.

The patent specification also states that certain onium halides are soluble enough such that "virtually no addition of solubilizer B is necessary." BASF argues that "virtually no addition" means that some solubilizer B can be added. However, this statement must be read in connection with the following sentence which states that "[a] [*29] procedure of this type [with virtually no addition of solubilizer] is equivalent to the claimed process." This language was part of the patent specification prior to the addition of claim 6. Thus, the "claimed process" referred to is the process covered by claims 1 to 5, in which the addition of solubilizer, regardless of how little, constituted a basic and novel characteristic of the process.

During the prosecution of the original '545 patent application, which included claims 1 to 5 only, the patent examiner relied on the specification language when he noted that solubilizer may not be necessary when certain halides are used as component A. On November 6, 1990, the examiner suggested what eventually became claim 6 of the '545 patent when he wrote that "this 'no solubilizer' embodiment is intended to be covered by the claims."

As noted above, one of the "basic and novel characteristics" of claim 6 is that component A is "intrinsically soluble." Because it is "intrinsically soluble" component B does not need to be added to make it soluble. In fact, the reason BASF eventually added claim 6 was because of the patent examiner's recognition that certain onium halides do not need the [*30] addition of component B to bring them into solution. BASF even admits this, stating in their argument that "[a] basic and novel characteristic of claim 6 is that it is a catalytic process for converting EpB to DHF which can be carried out virtually neat." Therefore, the addition of component B, a solubilizer, is not necessary and would alter this inherent trait.

Accordingly, the court concludes that the phrase "consists essentially of" excludes the addition of any component B, a solubilizer.

2. What Does "Substantially Soluble in the Reaction Medium" Mean?

BASF argues that the phrase "substantially soluble in the reaction medium" can be construed in three different ways.

First, BASF argues that the term "reaction medium" is not limited only to the EpB reactant and the DHF product, and that the "reaction medium" includes the chemical components of the reaction or by-products of EpB, such as oligomer. Eastman argues that "reaction medium" means only the EpB reactant and DHF product.

Second, BASF argues that "substantially soluble in the reaction medium" means that small amounts of solubilizer or solvent can be added. Eastman argues that the phrase "substantially soluble in [*31] the reaction medium" means that no solubilizers need to be added.

Third, BASF argues that the phrase "substantially soluble in the reaction medium" only includes a liquid-phase homogenous process, which means a liquid EpB feed, liquid catalysts, and liquid end products. Eastman argues that the phrase does not preclude a process in which EpB is fed in gas form, the catalyst system is liquid, and the end product is in gas form, because having catalysis in a liquid phase is the only phase-related limitation implicit in claim 6.

a. Does the term "reaction medium" include only EpB and DHF?

At column 2, lines 56 to 61 of the '545 patent, the specification states that "component B of the catalyst system must, because it acts as solubilizer for component A, be chosen such that the particular salts A dissolve in the reaction medium, i.e. in particular in the alkenyloxirane II and in mixtures thereof with the dihydrofuran I which are produced during the reaction." This is the only place in the patent where "reaction medium" is described. Because the language of the patent itself is not clear as to the definition of "reaction medium," the court will turn to the prosecution history for [*32] a definition of the term "reaction medium."

During the prosecution of the '545 patent, BASF attorneys defined reaction medium as EpB and DHF alone, when they wrote about limiting component A to an onium halide "which is substantially soluble in the liquid reaction medium," i.e. in the epoxy-butene [EpB] itself or its dihydrofuran [DHF] product." BASF attorneys also wrote that "Fischer Claim 6 is applicable only to those onium halides which are substantially soluble in the liquid epoxybutene or its products. Otherwise it would be necessary to add the organic solubilizing component B as in Fischer Claim 1." Furthermore, the "advantage of the process of Fischer Claim 6 is that no other solvent is required except the liquid epoxyalkene reactant itself (or its products) as the solvent capable of acting as the organic solubilizer for the onium halide catalyst to produce a single homogenous liquid phase."

Accordingly, the prosecution history demonstrates that the reaction medium consists of the EpB and the DHF only.

b. Does the phrase "substantially soluble in the reaction medium" include the addition of solubilizer?

BASF argues that because component A, the onium halide, [*33] need only be "substantially soluble," some solubilizer can be added. However, there is no evidence that the patent requires that all of component A dissolve. Rather, the patent focuses on the reaction that occurs during the catalytic rearrangement of EpB to DHF. Thus, the onium halide need only be soluble enough for catalysis to occur. Thus, "substantially soluble" does not mean that some solubilizer must be added to dissolve any remaining portion of component A.

Additionally, as noted above, the language used in the prosecution history also demonstrates that the phrase "substantially soluble in the reaction medium" means that no solubilizer is necessary. During the prosecution of the '545 patent, BASF attorneys contended that the language "substantially soluble in the liquid phase reaction medium" constitutes "an essential limitation which omits any need for a third component which is an organic solubilizer B as set forth in Fischer Claim 1." Furthermore, BASF wrote that "claim 6 was added to the

Fischer U.S. application to provide separate and explicit protection for this two-component catalyst system in the liquid phase reaction." This language makes it clear that claim 6 does [*34] not include the addition of any solubilizer.

Accordingly, the court concludes that the phrase "substantially soluble in the reaction medium" excludes the addition of any solubilizer.

c. Does the phrase "substantially soluble in the reaction medium" exclude gas feed processes?

As noted above, claim 6 precludes the addition of solubilizer because component A, the onium halide, is soluble enough for catalysis to occur without the addition of component B. Because component A is soluble it is capable of being dissolved, and if it is dissolved, it is in a liquid state. Therefore, if a required element of claim 6 is that component A is soluble in the reaction medium, it necessarily follows that the catalyst system must be in liquid phase.

Aside from the requirement that the catalyst system be in liquid phase, claim 6 does not impose any additional limitations on the form in which the catalytic rearrangement occurs. Rather, because claim 6 describes the catalyst system, and the reaction medium, it addresses the point at which catalytic rearrangement occurs, not any time before or after. Accordingly, there is no limitation on whether the EpB is added in gas form, or the DHF is removed [*35] as a gas, so long as the conversion from EpB to DHF occurs in a liquid phase. This comports with the court's construction of the term "reaction medium" to mean only EpB and DHF, as component A must be in liquid form as the EpB converts to DHF.

The court concludes that the only phase-related requirement of claim 6 is that the reactant and the catalyst are dissolved in the same liquid phase. Therefore, the phrase "substantially soluble in the reaction medium" does not exclude gas feed processes. Rather, it only means that the catalysis must occur in a liquid phase.

B. Infringement

BASF argues that Eastman's production of DHF at Longview infringes claim 6 of the '545 patent, and that Eastman is wilfully infringing. Eastman argues that it is not infringing.

1. Does The Longview Process Infringe Claim 6 Of The '545 Patent?

[HN6] Section 271(a) of the Patent Act states that "whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent therefor, infringes the patent." 35 U.S.C. § 271(a).

BASF argues that the Longview process [*36] infringes claim 6 of the '545 patent because Eastman catalytically rearranges EpB to DHF using a virtually solvent free process including a catalyst system of a Lewis acid and an onium halide which is "substantially soluble in the reaction medium" in a specific temperature range. Thus, BASF argues that the Longview process meets every element of claim 6. Eastman argues that claim 6 excludes the addition of solubilizer, and because the Longview process includes the addition of solubilizer Eastman is not infringing.

The Longview process begins with a catalyst system including onium halide, THF, and Lewis acid. The purpose of adding the THF to the EpB is to help dissolve the onium halide. Accordingly, consistent with this court's definition, THF acts as a solubilizer because its purpose is to dissolve component A, the onium halide. The '545 patent specification identifies THF as a solubilizer at column 3, line 59. Thus, at startup the Longview process does not infringe claim 6 of the '545 patent because of the addition of a solubilizer. However, BASF argues that because the THF is promptly removed from the system, the Longview process is run solubilizer-free and therefore, infringes [*37] claim 6.

As the THF is removed from the system, and the DHF is produced, approximately 3% of the EpB is converted to oligomer. Eastman builds up the oligomer to where it constitutes a substantial proportion of the system, and recycles it back into the system. The purpose of the oligomer is to help keep the onium halide in a liquid state. Accordingly, consistent with this court's definition, the oligomer acts as a solubilizer. Dr. George W. Gokel, Eastman's chemistry expert, testified at trial that the oligomer used in the Longview process is a podand. At column 3, lines 36 to 51, of the '545 patent, podands are identified as solubilizers. Thus, the Longview process is run with the continuous addition of solubilizer.

The court determined that claim 6 of the '545 patent precludes the addition of solubilizer. The Longview process uses two different solubilizers, THF and oligomer, in the production of DHF. Accordingly, the Longview process does not infringe claim 6 of the '545 patent.

2. Is Eastman Wilfully Infringing Claim 6 Of The '545 Patent?

Because the court concludes that Eastman's production of DHF at Longview does not infringe claim 6 of the '545 patent, the court concludes [*38] that Eastman is not wilfully infringing claim 6 of the '545 patent.

C. Invalidity

Eastman argues that claim 6 of the '545 patent is invalid on the grounds that Eastman's prior reductions to

practice establish priority of invention pursuant to § 102(g). [HN7] Section 102(g) provides that a person is entitled to a patent unless

before the application's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

35 U.S.C. § 102(g). Eastman argues that the gas feed work of Monnier and Low, and Falling's experiments, constitute prior reductions to practice, and that the '208 application disclosed the results of their experiments. BASF argues that claim 6 of the '545 patent is not invalid because Monnier and Low's work does not meet the limitations of claim 6, and because Falling abandoned, suppressed, [*39] or concealed his experiments.

[HN8] Claim 6 of the '545 patent is presumed to be valid. See 35 U.S.C. § 282. Eastman bears the burden of proving invalidity by clear and convincing evidence. See *Northern Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 935 (Fed. Cir.), cert. denied, 498 U.S. 920, 112 L. Ed. 2d 250, 111 S. Ct. 296 (1990). Clear and convincing evidence is shown when the trier of fact has "an abiding conviction that the truth of [the] factual contentions [is] highly probable." *Colorado v. New Mexico*, 467 U.S. 310, 316, 81 L. Ed. 2d 247, 104 S. Ct. 2433 (1984).

1. Does The Work Of Eastman's Scientists Constitute Prior Reduction to Practice Of Claim 6?

[HN9] To show prior reduction to practice, Eastman must show that its work "meet[s] every element of the claimed invention" before August 8, 1989, the priority date of the '545 patent application. *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1378 (Fed. Cir. 1986), cert. denied, 480 U.S. 947, 94 L. Ed. 2d 792, 107 S. Ct. 1606 (1987). See also *UMC Electronics Co. v. United States*, 816 F.2d 647, 651 (Fed. Cir. 1987), [*40] cert. denied, 484 U.S. 1025, 98 L. Ed. 2d 761, 108 S. Ct. 748 (1988) (stating that [HN10] "there cannot be a reduction to practice of the invention here without a physical embodiment which includes all limitations of the claim").

This court has construed claim 6 to mean the catalytic rearrangement of EpB to DHF at temperatures be-

tween 60 [degrees] and 200 [degrees] C, using a catalyst system including a Lewis acid and an onium halide that is "substantially soluble in the reaction medium," where the reaction medium includes the EpB and the DHF alone. The court concluded that claim 6 precludes the addition of any solubilizer, but permits the addition of solvent. Additionally, the court concluded that, as long as the catalysis occurs in a liquid phase, claim 6 has no other phase-related requirements. Thus, in order to establish a prior reduction to practice, Eastman must show an experiment that meets all of these elements of claim 6.

In December 1987, Eastman scientists created an EpB team to develop a process for converting EpB to DHF. This team included Falling, Monnier, and Low. In June 1988, Falling began to experiment with different catalyst systems for catalytically [*41] rearranging EpB to DHF. Falling's experiments included EpB in liquid form, liquid-phase catalysis, and the production of liquid DHF.

Eastman asserts that two types of experiments performed by Falling constitute a prior reduction to practice. First, Falling conducted solubilizer-free experiments using a catalyst system of an onium halide and a Lewis acid, and optionally including a solvent. Second, Falling conducted neat experiments, solubilizer- and solvent-free, using a catalyst system of an onium halide and a Lewis acid.

On June 9, 1988, Falling mixed a Lewis acid, an onium halide, and a solvent with EpB at 100 [degrees] C. This produced 4.4% DHF. Falling used tetrabutylammonium iodide as the onium halide. At trial, both Falling and Eastman's chemical engineering expert, Dr. Bruce Gates, testified that this particular onium halide is substantially soluble in EpB and DHF, the reaction medium. Falling conducted similar experiments on June 15, and June 28, and June 30, 1988, switching the temperature in the first, switching the Lewis acid in the second, and switching the solvent in the third. On October 3, 1988, Falling catalytically rearranged EpB to DHF by mixing a Lewis acid [*42] (tributyltin iodide), an onium halide (tetrabutylphosphonium iodide), and a solvent (toluene), at 150 [degrees] C.

Falling also conducted three neat experiments, without any solubilizer or solvent. On July 6, 1988, Falling obtained 71.2% DHF when he mixed EpB with a Lewis acid (zinc iodide) and an onium halide (tetrabutylammonium iodide) at 66 [degrees] to 70 [degrees] C. In a memo written two days latter to the EpB team, Falling reported that this mix of zinc iodide and tetrabutylammonium iodide is the "best catalyst system studied thus far." On July 18, and July 27, 1988, Falling conducted two more neat experiments, both of which resulted in the production of trace amounts of DHF.

While Falling conducted his experiments, Monnier and Low were also experimenting with various catalyst combinations to convert EpB to DHF. In November 1988, Monnier and Low began to experiment with the onium halide, Lewis acid catalyst system that Falling found so successful to the catalytic rearrangement of EpB to DHF. Between November 1988 and January 1990, Monnier and Low ran numerous experiments converting EpB to DHF using a catalyst system of a Lewis acid and an onium halide at 110 [degrees] [*43] to 185 [degrees] C. All of these experiments were conducted without solvent or solubilizer.

Monnier's and Low's experiments were all gas feed. However, the court has construed claim 6 to mean that only the catalysis must occur in liquid phase. Both Monnier and Low testified at trial that the catalysis occurred in a liquid phase. Monnier stated that

somewhere in this region after the tetraoctylammonium iodide has melted and formed a liquid phase, we have a situation where the EpB, which was added as a gas composition, actually dissolves into the liquid octyl ammonium iodide and now we have a classic situation of homogeneous catalysis where the reaction is occurring between EpB in the liquid phase and [octyl] ammonium iodide which is liquid-phase film.

Accordingly, all of these experiments conducted by Falling, Monnier, and Low, resulted in the catalytic conversion of EpB to DHF using component A, an onium halide, where component A is substantially soluble in the reaction medium, and component C, a Lewis acid, at the relevant temperature range. Although some of these experiments included the addition of a solvent, none included solubilizer, component B. Falling's, Monnier's, [*44] and Low's experiments, with or without solvent, successfully converted EpB to DHF meeting all of the limitations of claim 6.

Accordingly, Eastman has shown by clear and convincing evidence that these experiments constitute prior reductions to practice of claim 6 of the '545 patent before August 8, 1989, and unless Eastman abandoned, suppressed or concealed the experiments, they establish priority of invention pursuant to § 102(g).

2. Did Eastman Abandon, Suppress, Or Conceal Its Experiments?

BASF admits that Falling's neat experiments are within the scope of claim 6. However, BASF argues that Eastman abandoned, suppressed, or concealed, these experiments. Furthermore, as discussed above, BASF

argues that Monnier's and Low's experiments are not within the scope of claim 6, and therefore, the question of abandonment, suppression, or concealment is not relevant to their work.

[HN11] In order to show that Eastman did not abandon, suppress, or conceal experiments within the scope of claim 6, Eastman must show that it disclosed the process of claim 6 in a manner that would "bring the benefit of the knowledge of [the] invention" to the public, and that it did not unreasonably delay this [*45] disclosure. See *Checkpoint Systems, Inc. v. United States Int'l Trade Comm'n*, 54 F.3d 756, 761 (Fed. Cir. 1995). See also *National Presto Indus., Inc. v. Black & Decker (U.S.) Inc.*, 1995 U.S. App. LEXIS 15568, Nos. 92-1388, -1476, 1995 WL 367072, at *6 (Fed. Cir. June 20, 1995) (stating that [HN12] it "is necessary to consider the nature and extent of activity during the period between reduction to practice and the filing of the patent application"); *Lutzker v. Plet*, 843 F.2d 1364, 1366 (Fed. Cir. 1988) (noting that an invention that is not publicly disclosed is deemed abandoned, suppressed, or concealed).

Eastman filed the '208 patent application on March 8, 1990. This application primarily disclosed the gas feed, liquid phase catalyst work done by Monnier and Low, which constitutes prior reductions to practice of claim 6. Accordingly, they did not abandon, suppress, or conceal their experiments. Even if the court concluded that Monnier's and Low's work was not a prior reduction to practice of claim 6, the evidence shows that Eastman did not abandon, suppress, or conceal Falling's experiments which constitute prior reductions to practice.

Falling, Monnier, and Low [*46] worked from the early summer 1988 to the beginning of 1990 to create a successful process for catalytically rearranging EpB to DHF. During this time, Falling conducted numerous experiments which constitute prior reductions to practice of claim 6. Falling's monthly reports documented the progress of these experiments. Over a year after Falling first began to experiment with different catalyst systems, he wrote in an August 1, 1989, memo to the EpB team, that "the screening of catalyst systems for the homogenous rearrangement of EpB to 2,5-DHF is still in progress." Accordingly, it is clear that Eastman did not abandon Falling's experiments producing DHF from EpB. See *Checkpoint* 54 F.3d at 762 (finding that a four year delay between the time the inventor disclosed his invention to his employer, "further tested" and improved the invention, and worked towards commercializing it, "establish that [the inventor] was diligent in working toward commercializing" the security system, and did not constitute abandonment).

Although Eastman did not abandon Falling's experiments which establish prior reduction to practice, if

Eastman suppressed or concealed them, they will not [*47] invalidate claim 6. Eastman filed the '208 application in March 1990, and the CIP in December 1990. BASF argues that neither the original application nor the CIP disclose Faling's work, and therefore, Eastman suppressed or concealed Faling's prior reductions to practice of claim 6.

Although the '208 application did not include any working examples of Faling's experiments, it generally covered Faling's work. The '208 application disclosed a process for the catalytic rearrangement of EpB to DHF using a catalyst system of an onium halide and a Lewis acid. In June 1988, Faling first discovered that mixing an onium halide and a Lewis acid would act as a successful catalyst. Monnier and Low began using this catalyst system in November 1988, after seeing the results Faling was obtaining with it.

The '208 application also discussed the optional use of an inert solvent, which Faling had experimented with. In particular, on page 14, lines 14 to 24, the '208 application states that the "organic onium iodide, optionally, in combination with a Lewis acid co-catalyst, may be used with an inert organic solvent if desired." It further refers to the "optional, inert organic solvent."

Furthermore, [*48] on page 3, lines 5 to 8 of the '208 application, it states that the process contemplated includes recovery of the DHF produced by various methods, including "decantation" and "filtration." Monnier testified at trial that both decantation and filtration mean the removal of a liquid-phase product. Faling's work was done entirely in liquid phase, whereas Monnier's and Low's work was gas feed of EpB and a gas product of DHF.

Eastman filed the CIP on December 14, 1990. The CIP was based on Faling's and Lopez-Maldonado's invention report. The CIP described the catalyst systems made up of onium halides and Lewis acids that Faling had worked on. Furthermore, the CIP added working examples of liquid phase experiments to the '208 application. Thus, the CIP clearly disclosed Faling's work on converting EpB to DHF.

[HN13] The Federal Circuit has stated that "when determining whether an inventor has abandoned, suppressed, or concealed an invention, a period of delay between completion of the invention and subsequent public disclosure" is not always of legal significance. *Checkpoint*, 54 F.3d at 761. Faling last conducted a reduction to practice of claim 6 on October 3, 1988. Eastman [*49] filed the '208 patent application on March 8, 1990, approximately seventeen months later. Eastman filed the CIP on December 14, 1990, approximately twenty-six months later. The amount of time that elapsed

between Faling's last reduction to practice and the filing of the '208 patent application, and even the CIP, does not demonstrate suppression or concealment. See e.g., *Cochran v. Kresock*, 530 F.2d 385, 393 (C.C.P.A. 1976) (in a case involving a delay of over 18 months, stating that [HN14] "mere delay, without more, is insufficient" to demonstrate abandonment, suppression, or concealment); *Fisher and Speer v. Gardiner and Aymami*, 215 U.S.P.Q. 620 (PTO Bd. of App. 1981) (finding that a delay of 25 months between reduction to practice of the invention and filing the patent application did not constitute suppression or concealment).

In *Engelhardt v. Judd*, 54 C.C.P.A. 865, 369 F.2d 408, 412 (C.C.P.A. 1966), the United States Court of Customs and Patent Appeals stated that [HN15] scientists should be given a reasonable amount of time to refine their invention. The Engelhardt court stated that

[a] reasonable amount of time should be allowed [*50] for completion of the research project on the whole series of new compounds, a further reasonable period should then be allowed for drafting and filing the patent application(s) thereon, without subjecting the prior inventor or his assignee to the risk of forfeiture of valuable patent rights due to alleged concealment or suppression of the invention.

Id. The seventeen to twenty-six month period that elapsed between Faling's reduction to practice and the filing of the '208 application and the CIP constitutes a reasonable amount of time. Thus, the court concludes that Eastman did not suppress or conceal the work Faling did during the summer and fall of 1988.

The court concludes that Eastman did not abandon, suppress, or conceal the prior reductions to practice of claim 6 of the '545 patent, and therefore, claim 6 is invalid on the grounds of priority of invention pursuant to § 102(g).

III. CONCLUSION

For the reasons stated above, the court concludes that Eastman is not infringing claim 6 of the '545 patent, claim 6 is invalid on the grounds of priority of invention pursuant to § 102(g), and Eastman did not abandon, suppress, or conceal the invalidating prior [*51] reductions to practice. The court will enter an order in accordance with this memorandum opinion.

LEXSEE 2006 US APP LEXIS 14050

XEROX CORPORATION, Plaintiff-Appellant, v. 3COM CORPORATION, U.S. ROBOTICS CORPORATION, U.S. ROBOTICS ACCESS CORP., PALM COMPUTING, INC., PALM, INC., PALMSOURCE, INC., and PALMONE, INC., Defendants-Appellees.

04-1470

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

2006 U.S. App. LEXIS 14050

June 8, 2006, Decided

PRIOR HISTORY: [*1] Appealed from: United States District Court for the Western District of New York. Judge Michael A. Telesca. *Xerox Corp. v. 3Com Corp.*, 2004 U.S. Dist. LEXIS 9717 (W.D.N.Y., May 21, 2004)

OUTCOME: The court reversed the judgment in part, vacated it in part, and remanded.

LexisNexis(R) Headnotes**CASE SUMMARY:**

PROCEDURAL POSTURE: Appellant patent owner sought review of a summary judgment order from the United States District Court for the Western District of New York, in which that court held invalid certain claims of a patent for computerized interpretation of handwritten text.

OVERVIEW: This case began with the patent owner's infringement action brought against appellee competitors. The competitors alleged that the patent at issue was invalid and the trial court and appellate court entered several prior rulings in the litigation. At issue here was the trial court's ruling that certain claims in the patent were invalid for anticipation and obviousness and that certain claims were invalid for indefiniteness. On review, the court vacated the grant of summary judgment as to invalidity for anticipation because it concluded that there were genuine issues of material fact with regard to whether the prior art disclosed various "stroke direction" limitations of the asserted patent claims. In light of the court's conclusions with respect to the stroke direction limitations, it could not sustain the trial court's judgment as to obviousness either and remanded for a determination of whether the invention would have been obvious in light of the court's stroke direction analysis. As to indefiniteness, the court reversed because it found that the claims at issue were not insolubly ambiguous with respect to the term "sloppiness space," but instead were subject to construction.

Patent Law > Anticipation & Novelty > Elements

[HN1] Patent invalidity by anticipation requires that the four corners of a single, prior art document describe every element of the claimed invention.

Patent Law > Claims & Specifications > Definiteness > General Overview

[HN2] Claims in a patent are not indefinite when the specification provided a general guideline and examples sufficient to enable a person of ordinary skill in the art to determine whether the claim limitation is satisfied.

Patent Law > Claims & Specifications > Definiteness > General Overview

[HN3] A claim will not be held invalid if the meaning of the claim is discernible, even though the task may be formidable and the conclusion may be one over which reasonable persons will disagree.

COUNSEL: Donald R. Dunner, Finnegan, Henderson, Farabow, Garrett & Dunner, L.L.P., of Washington, DC, argued for plaintiff-appellant. With him on the brief were Thomas H. Jenkins; and R. Bruce Bower, of Atlanta, Georgia. Of counsel on the brief were James A. Oliff, Edward P. Walker, and Richard E. Rice, Oliff & Berridge, PLC, of Alexandria, Virginia.

William F. Lee, Wilmer Cutler Pickering Hale and Dorr LLP, of Boston, Massachusetts, argued for defendants-

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appellees. With him on the brief were Mark G. Matuschak, Richard W. O'Neill, and John M. Golden; and James L. Quarles III, of Washington, DC.

JUDGES: Before NEWMAN, RADER, and BRYSON, Circuit Judges.

OPINIONBY: BRYSON

OPINION: BRYSON, Circuit Judge.

Xerox Corporation appeals from a summary judgment entered by the United States District Court for the Western District of New York, in which the court held invalid claims 1-3 and 7-16 of Xerox's *U.S. Patent No. 5,596,656* ("the '656 patent"). Because we conclude that there are genuine issues of material fact remaining in dispute with regard to whether the prior art discloses all of the [*2] relevant claim limitations, we reverse the grant of summary judgment of invalidity for anticipation and obviousness and we remand the case to the district court for further proceedings on those issues. Because we conclude that claims 9 and 11 are not insolubly ambiguous, we reverse the district court's grant of summary judgment holding those claims invalid for indefiniteness.

I

The '656 patent discloses a system and method for "computerized interpretation of handwritten text." '656 patent, col. 2, ll. 36-37. The system employs an alphabet of "unistroke symbols" that correspond to alphanumeric characters such as Arabic numerals and the letters of the English alphabet. Each unistroke symbol consists of a single, unbroken pen stroke that can be recognized by a computer upon some delimiting operation, such as lifting the pen from a computer-connected, pressure-sensitive writing surface.

Claims 1-3 and 7-16 of the '656 patent provide as follows:

1. A system for interpreting handwritten text comprising

a user interface including a manually manipulable pointer for writing mutually independent unistroke symbols in sequential time order and a user controlled signaling mechanism [*3] for performing a predetermined, symbol independent, delimiting operation between successive unistroke symbols in said sequential order, some of said unistroke symbols being linear and others being arcuate, each of said unistroke symbols representing a predefined textual component said delimiting operation distinguishing said unistroke symbols

from each other totally independent of without reference to their spatial relationship with respect to each other;

a sensor mechanism coupled to said user interface for transforming said unistroke symbols into corresponding ordered lists of spatial coordinates in said sequential order;

a recognition unit coupled to respond to said sensor mechanism for convening said ordered lists of coordinates into corresponding computer recognizable codes in said sequential order, each of said codes representing a corresponding textual component;

a display; and

a character generator coupled to said recognition unit and to said display for writing the textual components defined by said codes on said display in a spatial order that corresponds to the sequential order of said codes.

2. The system of claim 1 wherein

said user interface [*4] further includes a substantially planar writing surface;

said unistroke symbols are written on said writing surface; and

said sensor mechanism transforms each of said unistroke symbols into an ordered list of x,y coordinate pairs.

3. The system of claim 2 wherein

said pointer is a passive device that is manually engaged with, drawn across, and then disengaged from said writing surface to define the geometric shape and direction of each of said unistroke symbols; and

said writing surface is interfaced with said sensor mechanism for inputting the geometric shape and direction of each of said unistroke symbols to said sensor mechanism.

7. The system of any of claims 2-6 wherein

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said pointer is a stylus.

8. The system of claim 2 wherein

said unistroke symbols are delimited from each other in said sequential time order by making and breaking contact between said pointer and said writing surface once for each unistroke symbol.

9. The system of claims 2, 3, 4, 5 or 6 wherein said unistroke symbols are well separated from each other in sloppiness space.

10. A machine implemented method for interpreting handwritten text comprising

writing said text in [*5] sequential time order using an alphabet of mutually independent unistroke symbols to spell out said text at an atomic level, each of said unistroke symbols conforming to a respective graphical specification that includes a stroke direction parameter, some of said unistroke symbols having graphical specifications that differ from each other essentially only on the basis of their respective stroke direction parameters, some of said unistroke symbols being linear and others being arcuate;

entering a predetermined, symbol independent delimiter between successive ones of said unistroke symbols in said time order, said delimiter distinguishing successive unistroke symbols from each other

without reference to and totally independently of their spatial relationship with respect to each other;

capturing the stroke direction of each of said unistroke symbols as an ordered list of coordinates;

disambiguating said unistroke symbols from each other based upon predetermined criteria, including the stroke directions of the respective symbols.

11. The method of claim 10 wherein said unistroke symbols are well separated from each other in sloppiness space.

12. A handwriting recognition [*6] process for pen computers, said process comprising the steps of

correlating unistroke symbols with natural language alphanumeric symbols, each of said unistroke symbols being fully defined by a single continuous stroke that conforms geometrically and directionally to a predetermined graphical specification, some of said unistroke symbols being linear and others being arcuate;

entering user written unistroke symbols into buffer memory in sequential time order, successive ones of said unistroke symbols being delimited from each other by a predetermined, symbol independent delimiting operation, said delimiting operation distinguishing successive unistroke symbols from each other without reference to and totally independently of their spatial relationship with respect to each other;

reading out said unistroke symbols from buffer memory in sequential time order to provide buffered unistroke symbols;

translating each buffered unistroke symbol that correlates with a natural language symbol into said natural language symbol; and

outputting any natural language symbols that are produced by such translating to a utilization device.

13. The handwriting recognition process [*7] of claim 12 wherein certain unistroke symbols correlate with natural language alphanumeric symbols, and other unistroke symbols correlate with user invokeable control functions.

14. The handwriting process of claim 13 wherein at least one of said other unistroke symbols correlates with a control function that shifts the correlation of at least some of said certain unistroke symbols from one set of natural language alphanumeric symbols to another set of natural language alphanumeric symbols.

15. The handwriting recognition process of claim 14 wherein said control function shifts said correlation for just one

following unistroke symbol and then re-stores said correlation to an initial state.

16. A machine implemented handwriting recognition process comprising the steps of

correlating natural language symbols with unistroke symbols, where each of said unistroke symbols is fully defined by a single continuous stroke that conforms geometrically and directionally to a predetermined graphical specification, at least certain of said unistroke symbols being arcuate;

writing user selected unistroke symbols in sequential time order while performing a predetermined, symbol independent [*8] delimiting operation for delimiting successive ones of said unistroke symbols from each other, said delimiting operation distinguishing successive unistroke symbols from each other without reference to and totally independently of the spatial relationship of said unistroke symbols with respect to each other;

detecting said selected unistroke symbols; and

translating the detected unistroke symbols that are written into said machine into a corresponding natural language representation.

In 1997, Xerox brought suit against 3Com Corporation and six other defendants (collectively, "3Com"). Xerox alleged that the '656 patent was infringed by 3Com's "Graffiti" system for handwriting recognition, which is used with 3Com's PalmPilot handheld digital devices. 3Com then requested that the U.S. Patent and Trademark Office reexamine the '656 patent. Following consideration of a number of prior art references, including a journal article written by D.J. Burr and a Japanese patent application by Tadahiro Nagayama, the Patent and Trademark Office confirmed the patentability of all 16 of the patent's claims.

The district court meanwhile construed the claims and granted summary judgment [*9] of noninfringement. On Xerox's appeal to this court, we agreed with the district court's construction of certain contested claim terms: We upheld the district court's ruling that the term "unistroke symbols" requires "sufficient graphical separation for the computer to definitively recognize a symbol immediately upon delimitation or pen lift." *Xerox*

Corp. v. 3Com Corp., 267 F.3d 1361, 1366 (Fed. Cir. 2001) ("Xerox I"). We also agreed that "spatial independence" means that the invention must be "capable of properly distinguishing and recognizing symbols without reference to where a previous symbol was written on the writing surface." *Id.* at 1367.

Nonetheless, we concluded that the district court had erred in granting summary judgment of noninfringement. In particular, we disagreed with the court's conclusion that it was clear that the Graffiti symbols were not sufficiently "graphically separated" from each other to be unistroke symbols; that the Graffiti system did not allow for "definitive recognition" of symbols immediately upon pen lift by the user; and that the Graffiti system did not feature "spatial independence." First, we noted that a number [*10] of the claims recited symbols having graphical separation based on "geometric shape and direction," and that some of Graffiti's symbols, which are similar geometrically, are distinguishable based on stroke direction. We held that the district court had erred in "looking only to the geometry of the symbol and ignoring the direction the pen must travel to create the symbol." *Id.* at 1368. Second, we held that the district court "was incorrect that Graffiti does not allow for definitive recognition of all symbols immediately upon pen lift," since none of the Graffiti symbols are altered by subsequent strokes. *Id.* Third, we held that the court had erred in concluding that Graffiti "does not employ 'spatial independence.'" *Id.* The spatial independence limitation is met, we held, "if the computer recognizes the symbol without reference to where a previous symbol was written," which is a feature found in the Graffiti system. *Id.* at 1369 (emphasis in original). We therefore remanded the case to the district court for further proceedings on the issues of infringement and invalidity.

On remand, the district court granted summary judgment of infringement. [*11] In addition, the court held that the '656 patent was not invalid because it concluded that this court, in *Xerox I*, "presumably did not construe the claims in such a way as to be invalid." *Xerox Corp. v. 3Com Corp.*, 198 F. Supp. 2d 283, 296 (W.D.N.Y. 2001). 3Com appealed from that judgment. On appeal, we affirmed the district court's claim construction and its grant of summary judgment of infringement. With respect to the issue of invalidity, however, we held that our prior decision on the issue of claim construction "did not obviate the need for a separate validity analysis," and we therefore reversed the district court on that issue. *Xerox Corp. v. 3Com Corp.*, 61 Fed. Appx. 680, 681 (Fed. Cir. 2003) ("Xerox II").

In doing so, we addressed a point raised on appeal "[i]n an effort to provide some guidance to the district court on remand." *Xerox II*, 61 Fed. Appx. at 684. Specifically, we explained that "definitive recognition" does

"not require a permanent, unalterable choice of a symbol that cannot be changed if the recognition is later determined to be erroneous." *Id.* That is, "subsequent action by the user or subsequent [*12] processing by the computer to delete or replace [the] symbol does not negate . . . recognition." *Id.* In short, "definitive recognition" occurs when the "system completes the recognition of the unistroke symbol." *Id.*

On remand, the district court issued two orders. In its first order, the court granted summary judgment of invalidity. *Xerox Corp. v. 3Com Corp.*, 2004 U.S. Dist. LEXIS 9717, No. 97-CV-6182T, at *16 (W.D.N.Y. May 26, 2004). The court found that "[b]oth the Burr and Nagayama references teach the use of single-stroke symbols that are definitively recognized upon pen lift." 2004 U.S. Dist. LEXIS 9717 at *13-*14. In response to Xerox's argument that both systems provide for additional actions following symbol recognition, the district court pointed to this court's decision in *Xerox II* and explained that "these additional manipulations of the entered data do not transform the definitive recognition of the symbol that has already occurred into tentative recognition." 2004 U.S. Dist. LEXIS 9717 at *15. Thus, the district court concluded that the evidence demonstrates that "each reference discloses the creation of unique symbols which are capable of being definitively recognized by the recognition device." 2004 U.S. Dist. LEXIS 9717 at *16.

Responding [*13] to Xerox's argument that Burr's symbol recognition system is sometimes inaccurate and thus the symbols of Burr cannot be said to have sufficient graphical separation to permit definitive recognition, the district court explained that "[w]hether or not the reader recognizes the symbol intended by the writer is irrelevant for purposes of determining whether or not symbols are graphically separate such that each symbol will be definitively recognized upon delimitation." 2004 U.S. Dist. LEXIS 9717 at *17-*18 (emphasis in original). The district court explained that although some symbols may be "visually similar to the human eye, they will be considered graphically separate as long as each symbol is definitively recognized upon pen lift." 2004 U.S. Dist. LEXIS 9717 at *18.

The district court also rejected Xerox's argument that neither Burr nor Nagayama teaches a "set" of single-stroke symbols. The court explained that Burr "allows the user to define the stroke-set to be used" and therefore "discloses a set of 26 single-stroke curves which correspond to letters of the English alphabet." 2004 U.S. Dist. LEXIS 9717 at *16. The court noted that Nagayama expressly requires "a set of two or more characters or figures, each of which have a single [*14] stroke." 2004 U.S. Dist. LEXIS 9717 at *14.

The court further concluded that both Burr and Nagayama teach "spatial independence" because both "teach devices which allow symbols to be written anywhere on the recognition device surface." 2004 U.S. Dist. LEXIS 9717 at *19. In response to an argument raised by Xerox, the court explained that "even if spatial relationships are used to group words [in Burr], the symbols are distinguished and recognized without reference to where a previous symbol was written." 2004 U.S. Dist. LEXIS 9717 at *19. Based on that analysis, the court granted 3Com's motion for summary judgment of invalidity.

Both parties sought clarification because the district court's first order did not specifically address the asserted independent and dependent claims. The district court then issued a second order in which it granted summary judgment of invalidity based on specific findings as to each limitation of the asserted claims. *Xerox Corp. v. 3Com Corp.*, 2005 U.S. Dist. LEXIS 5991, No. 97-CV-6182T, at *2 (W.D.N.Y. Mar. 1, 2005). In particular, the court ruled that Burr and Nagayama disclose the limitation that "some of the single-stroke symbols [are] linear and others arcuate." 2005 U.S. Dist. LEXIS 5991 at *11. In that regard, the district court noted that a [*15] figure contained in Burr depicted the "t" symbol as "made of two intersecting lines each of which are essentially straight" and that Nagayama "discusses how a linear symbol created by the user may be recognized by the reader and used to generate a graphical depiction of two lines." *Id.*

The court next rejected Xerox's argument that Nagayama does not disclose a system for text entry. It explained that "[w]hile it is true that Nagayama discloses a method for inputting commands, that method relies on the inputting of single-stroke symbols that correspond to textual characters, and the display of those characters to confirm the correct input." 2005 U.S. Dist. LEXIS 5991 at *13.

The court also concluded that "Burr incorporates single-stroke symbols that differ from each other essentially only on the basis of stroke direction." 2005 U.S. Dist. LEXIS 5991 at *18. The court reasoned that "the Burr symbols for 'o' and 'a' differ essentially only on the basis of the vertical line extending downward from the middle of the left [sic] side of the oval of the 'a'." *Id.* The court added that the "stroke direction" claim limitation "is further invalidated as anticipated [because] Burr teaches the use of a time-warp algorithm, [*16] which takes into account stroke direction by considering the temporal relationship between the points making up the single-stroke symbol." 2005 U.S. Dist. LEXIS 5991 at *19.

Addressing claims 14 and 15, which recite at least one unistroke symbol that correlates with a control func-

tion that shifts the correlations of some of the unistroke signals from one set of natural language symbols to another, the court found those claims to be obvious in light of Nagayama as combined with the prior art system of Organek. The court explained that it would have been obvious to one skilled in the art of handwriting recognition to combine Organek's disclosure of single-stroke symbols to invoke control functions (such as "shift" or "caps lock") with Nagayama's teaching of single-stroke symbols to convert graphics displayed on a screen. *2005 U.S. Dist. LEXIS 5991 at *30.*

Finally, the court held claims 9 and 11 invalid for indefiniteness. Those claims recite an additional limitation that the unistroke symbols must be "well separated from each other in sloppiness space." The court explained that the claim term "sloppiness space" is ambiguous and "is not clearly defined or explained in the patent to an extent that would allow one skilled in [*17] the art to understand how symbols can be well separated in sloppiness space." *2005 U.S. Dist. LEXIS 5991 at *27.* Moreover, the court added that "sloppiness space" is "not a term of art used in the industry, and does not convey a concept that was known in the industry." *2005 U.S. Dist. LEXIS 5991 at *26.* Thus, according to the district court, "there is no way to determine whether or not two symbols do achieve sufficient separation so as to be well separated in sloppiness space." *2005 U.S. Dist. LEXIS 5991 at *27.* Consequently, the court found the term "sloppiness space" to be ambiguous and concluded that claims 9 and 11 are therefore invalid for indefiniteness under *35 U.S.C. § 112*. The court further concluded that "[e]ven if claims 9 and 11 are not invalid as indefinite, . . . those claims are anticipated by Burr." *2005 U.S. Dist. LEXIS 5991 at *27.* The district court explained that most of Burr's symbols are "vastly different from one another, thus practicing sufficient separation in sloppiness space." With respect to the Burr symbols that appear to have some overlap, such as the "i" and the "l," the court held that those symbols "practice sloppiness separation just as [much as] the Graffiti symbols" that had already been held to infringe. [*18] *2005 U.S. Dist. LEXIS 5991 at *27.*

II

Xerox argues that the district court erred in granting summary judgment of invalidity for 3Com as to claims 1-3 and 7-16, and that the court should have granted Xerox's cross-motion for summary judgment on the issue of invalidity. In its brief, Xerox addresses four invalidity issues-anticipation by Burr (applicable to claims 1-3, 7-12, and 16; anticipation by Nagayama (applicable to claims 1-3, 7-8, 12-13, and 16); obviousness in light of Nagayama combined with Organek (applicable to claims 14 and 15); and indefiniteness (applicable to claims 9 and 11). We address Xerox's anticipation arguments to-

gether and the obviousness and indefiniteness arguments separately.

A. Anticipation by Burr and Nagayama

1. "Unistroke Symbols"

Xerox argues that the '*656 patent* is not anticipated because neither Burr nor Nagayama discloses "unistroke symbols," a limitation that is present in every claim of the '*656 patent*. The term "unistroke symbols" is defined to mean symbols having "sufficient graphical separation for the computer to definitively recognize a symbol immediately upon delimitation or pen lift." Citing our discussion of unistroke symbols in *Xerox II*, Xerox contends [*19] that the invention of Burr fails to "complete[] the recognition" of the symbols upon pen lift because Burr merely provides for creation of a set of 26 "dissimilarity" numbers representing the most probable symbol shape matches. According to Xerox, recognition in Burr is not complete until after "dictionary lookup" occurs. As we explained in *Xerox II*, however, "[d]efinitive recognition does not require a permanent, unalterable choice of a symbol that cannot be changed if the recognition is later determined to be erroneous." *61 Fed. Appx. at 684.* In Burr, shape matching of each inputted symbol occurs independent of dictionary verification. In fact, Burr explicitly describes two distinct steps: "warp-based character matching" and "dictionary lookup." See D.J. Burr, *Designing a Handwriting Reader*, IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. PAMI-5, No. 5, at 554 (Sept. 1983) ("Burr"). Thus, dictionary lookup is not a step necessary for "recognition" of a character to occur; it simply serves as a means for later determining that a particular recognition may be erroneous.

Likewise, Nagayama's "confirmation" step does not preclude Nagayama's [*20] system from "complet[ing] the recognition" upon pen lift. As Nagayama explains, upon pen lift, "once [a centering] move has been completed, [the written character] is compared with reference standard patterns in the dictionary . . . , and if a high-correlation character is found in the dictionary, the character is deemed recognized." See *Control Method Using Real-time Recognition of Handwritten Character Patterns*, Japanese Patent Application Kokai No. SHO59-35277, at 5 (filed Aug. 23, 1982) ("Nagayama"). The character is then "displayed for visual confirmation." *Id.* As in Burr, the subsequent step in Nagayama serves only as a means to correct errors in the recognition that has already occurred. In the words used by the district court in its construction of the term "unistroke symbols," which we upheld in *Xerox I*, both Burr and Nagayama "definitively recognize a symbol immediately upon delimitation or pen lift."

Xerox contends that Burr does not disclose a system in which the symbols have "sufficient graphical separation to permit the computer to definitively recognize the symbol" upon pen lift, and thus Burr does not disclose the use of "unistroke symbols." "Sufficient [*21] graphical separation," however, is not a quality that exists in a vacuum. As is clear from the district court's claim construction, which Xerox accepts, "graphical separation" among the symbols is "sufficient" if it permits the computer to distinguish the symbols upon pen lift. Thus, if the computer is capable of differentiating among symbols upon pen lift, there is "sufficient graphical separation" among them, and if the computer does not have that capability, there is not "sufficient graphical separation," despite the similarities or differences that may appear to a casual observer of the symbols. Because Burr discloses a system in which definitive recognition occurs upon pen lift, as discussed above, there is necessarily sufficient graphical separation among those symbols to permit the computer to achieve definitive recognition.

Xerox makes the related argument that definitive recognition "requires accurate recognition." It contends that Burr fails to disclose symbols that are "accurately recognized on pen lift" because Burr does not teach "specific reference symbols, . . . provides no guidance for choosing symbols that are graphically separate, and . . . places no restrictions [*22] on the user's choice of symbols." Xerox makes a similar argument with regard to the Nagayama reference. Yet nothing in the language of the claims or in the specification supports Xerox's proposal that a particular degree of accuracy is necessary for a system to qualify as producing "definitive recognition." Moreover, even if some degree of accuracy were required, an expert for the defendants, in a journal article published prior to this litigation, reported that Burr's invention achieves 90 percent character recognition accuracy without dictionary lookup. See Charles C. Tappert et al., *The State of the Art in On-Line Handwriting Recognition*, IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. 12, No. 1, at 797 (Aug. 1990). Although Xerox suggests that a system must be "over 95%" accurate in order for it to qualify for "definitive recognition" under the '656 patent, nothing in the patent indicates that 95 percent accuracy constitutes "definitive recognition" but 90 percent accuracy does not. Xerox's arguments regarding "accurate recognition" are therefore unavailing.

Xerox further argues that Burr and Nagayama do not anticipate the '656 patent claims, because [*23] neither reference discloses "a set of reference symbols that a user would emulate." Yet there is no indication in the claim language that any such prototype symbols are required, and Xerox certainly does not suggest that its claims should be confined to the particular set of symbols illus-

trated in Figure 2 of the '656 patent. Even if we were to read the claims as requiring that the system provide some set of symbols for the user to employ, Burr supplies a set of representative single stroke symbols that can be emulated by the user, even though it also permits the user to define his own stroke set. Similarly, Nagayama provides "examples of single-stroke characters that could be used with the present invention." Xerox's argument regarding unistroke symbols is therefore without merit.

2. "Distinguishing said unistroke symbols from each other totally independent of and without reference to their spatial relationship"

Xerox contends that there is a material factual dispute between the parties as to whether Burr discloses symbols that have "spatial independence." Xerox asserts that Burr requires its users to "segregate and group written strokes into words," thus "suggesting that [*24] to properly distinguish and recognize at least the first input symbol of a word, Burr's computer must reference where the last symbol of the previous word was written on a writing surface." As explained by the district court on remand, however, "even if Burr does rely on spatial relationships to group words, that function has no effect on . . . the system[']s ability] to distinguish and recognize symbols without reference to where a previous symbol was written." In other words, even if Burr's dictionary lookup relies upon the location of a previously inputted symbol, Burr's shape-matching algorithm works without regard to where a previous symbol was written. The spatial independence feature in Burr is evidenced by the fact that, as the Burr article explains, "[b]efore any correlation is done between two curves, each is independently normalized in three steps": centering, re-sizing, and detilting. Such positional adjustments preclude recognition that is dependent upon the locations where successive symbols are written. Consequently, there is no material factual dispute with regard to the "spatial independence" limitation.

3. "Some of said unistroke symbols being linear"

Xerox [*25] argues that Burr fails to disclose the claim limitation that recites "some of said unistroke symbols being linear," which is present in all of the asserted claims except for claim 16. In particular, Xerox contends that the district court erred in concluding that the symbol, depicted in Fig. 5(b) of the Burr article, is linear. According to Xerox, "two lines intersecting at substantially right angles do not yield a linear symbol." Yet this argument overlooks the fact that the term "linear" can be defined as "of or pertaining to a line or lines." See 8 Oxford English Dictionary 983 (2d ed. 1989); Random House Unabridged Dictionary 1117 (2d ed. 1993) ("of, consisting of, or using lines"); Encarta World English Dictionary 1048 (1999) ("relating to, consisting

of, or using lines"). Moreover, each time the term "linear" is used in the claims, it is used in contrast to the term "arcuate," as in claim 1, which recites "some of said unistroke symbols being linear and others being arcuate." '656 patent, col. 7, ll. 16-17; see also id. col. 8, ll. 41-42 (claim 10); id. col. 8, ll. 64-65 (claim 12). The reference to "some" symbols being arcuate and "others" being linear [*26] indicates that the term "linear" was used in the patent to denote consisting of a straight line or lines, as opposed to consisting of curves.

We agree with the district court that Burr's symbol for the letter "t," represented by the figure [SYMBOL OMITTED] and drawn with a single stroke, discloses a "linear" symbol as that term is used in the '656 patent. Burr states that all of the symbols used in the Burr system consist of a single stroke created without "pen lift," and Figures 5 and 6 of the Burr article demonstrate that the symbol [SYMBOL OMITTED] is readily recognized as a "t," even without dictionary lookup. Xerox's argument regarding the "linear" claim limitation is thus unpersuasive.

4. Text Entry

Xerox asserts that all claims require "text entry" and that the Nagayama reference fails to anticipate because "each symbol is 'mapped to commands and functions' and not 'text.'" For support, Xerox points to the term "natural language" contained in claims 12 and 16. See '656 patent, col. 9, ll. 17-18; col. 10, ll. 24-25. Although Xerox is correct that those claims recite outputting natural language symbols as a result of inputting unistroke symbols, Nagayama nonetheless [*27] discloses this claim limitation. Nagayama explains that the memory in its invention "contain[s] a dictionary of reference standard characters, signals for commands, functions, etc." In this manner, Nagayama distinguishes "characters" from "commands" or "functions." Nagayama then states that after a single-stroke character is written, it is compared with the reference standard patterns in the dictionary; if a "high-correlation character" is found in the dictionary, the character is deemed recognized and is displayed. Only after such character display (and subsequent user confirmation) is a "signal corresponding to the recognized character . . . read from the memory 14 (Step 15), and sent to the computational control circuit." See Nagayama at 5; see also id. at 9-10, Figs. 3 and 4. In other words, command entry and function selection occur as independent steps following character display. Nagayama is thus directed not only to command entry and function selection by recognition of handwritten characters, figures, and symbols; it recites output of text as well. As a result, Xerox's argument that Nagayama fails to disclose "text entry" is unavailing.

5. Stroke Direction [*28]

Xerox contends that Burr does not disclose unistroke symbols in which graphical separation is based on both geometric shape distinctions and differences in stroke direction. Xerox argues that Burr does not rely on stroke direction to identify symbols, but instead "discusses identifying symbols by 'shape-matching,' 'difference[s] in shape,' and dissimilarity of a drawn character to 'each of the set of reference shapes.'"

The patent uses "stroke direction" in two ways that are pertinent to the anticipation issue. Claim 10 recites a system having some symbols with "graphical specifications that differ from each other essentially only on the basis of their respective stroke direction parameters." That is, the claimed system has "several pairs of symbols that are geometrically identical; but for direction, the computer could not discern between them." See *Xerox I*, 267 F.3d at 1368. Such pairs of symbols include, for example, Xerox's symbols for "c" and "d" ([SYMBOL OMITTED] and [SYMBOL OMITTED]). Other claims, such as claims 12-16, refer to strokes that "conform[] geometrically and directionally to a predetermined graphical specification" to indicate that the [*29] recited system captures and employs both the shape and the direction of the strokes as a means of differentiating symbols. An example of a pair of symbols distinguishable based on a combination of shape and stroke direction would be Xerox's symbols for "v" and "w" ([SYMBOL OMITTED] and [SYMBOL OMITTED]). It was in this sense that we referred in *Xerox I* to Graffiti's symbols for "O" and "Q" ([SYMBOL OMITTED] and [SYMBOL OMITTED]) as illustrating the use of stroke direction as well as shape to distinguish symbols. In so doing, we distinguished Graffiti from the Whitaker prior art. We explained that Whitaker cannot "discern" unistrokes by stroke direction because in the Whitaker system symbols are "written . . . on a sheet of paper" and then "scanned all at once into a computer," so that the system is "unable to discern the direction in which a symbol is drawn." Id.

The district court compared the pair of Graffiti symbols for "O" and "Q" ([SYMBOL OMITTED] and [SYMBOL OMITTED]) with the pair of Burr symbols for "o" and "a" ([SYMBOL OMITTED] and [SYMBOL OMITTED]). The court found that "[l]ike the Graffiti symbols for 'O' and 'Q' that differ only on the [*30] basis of the horizontal line extending from the top of the oval, the Burr symbols for 'o' and 'a' differ essentially only on the basis of the vertical line extending downward from the middle of the left [sic] side of the oval of the 'a.'" Based on that comparison, the court concluded that if Graffiti uses stroke direction as an element of graphical separation, Burr necessarily does as well. Despite the visual similarities between the two pairs of symbols, however, that conclusion does not necessarily follow. The two pairs of symbols would be parallel for purposes

of anticipation only if it were determined that Burr captures and uses stroke direction in distinguishing among symbols. Absent the use of stroke direction, a system such as that disclosed in Burr would rely only on the geometric shape of the symbols to distinguish them, which would not be sufficient to anticipate the invention's use of stroke direction as a distinguishing mechanism.

3Com argues that, based on this court's discussion of the term "stroke direction" in Xerox I, it is clear that the Burr article discloses that limitation. We do not agree. In Xerox I, we held that although some of the Graffiti symbols [*31] look much alike, the element of stroke direction serves to distinguish them. Because Graffiti captures and uses stroke direction in differentiating symbols, we held that the district court was wrong to disregard that aspect of graphical separation in the Graffiti system. The question before us now is whether Burr discloses the use of stroke direction in differentiating symbols and thus anticipates that limitation.

3Com argues that Burr's shape-matching algorithm "considers . . . stroke direction information in finding a 'best match' with stored reference shapes." In particular, 3Com argues that Burr necessarily relies on stroke direction because it teaches "dynamic programming," which involves "serially connecting sampled coordinates" to form 2-D vectors, "with orientation in the direction of time flow." Additionally, at oral argument 3Com's counsel pointed to the use of the term "antiparallel" in the text accompanying Figure 2 of the Burr article as evidence that stroke direction is a component of Burr's shape-matching algorithm.

A close reading of the Burr article, however, suggests that although Burr's invention undoubtedly captures stroke direction data, it may not use that data [*32] to distinguish one symbol from another. In its discussion of "dynamic programming," Burr explains that shape-matching is conducted by representing each character as a string of 2-D vectors "formed by serially connecting sampled coordinates from the digitizer, taken at constant sampling rate," with each 2-D vector "orient[ed] in the direction of time flow." Burr, at 555. Inputted symbols are then compared to reference shapes by determining the "element-to-element distance measure between two vectors [one from each curve] . . . based on their relative positions and orientations." Id. This calculation factors in the angle between the inputted vector ([SYMBOL OMITTED]) and the reference vector ([SYMBOL OMITTED]), the angle of a constructed vector ([SYMBOL OMITTED]) from the tail of [SYMBOL OMITTED] to the midpoint of [SYMBOL OMITTED] , as well as two correction terms [gamma] and [epsilon]. Burr explains that [epsilon] is a correction term that "inhibits positional misalignment" while [gamma] is a cor-

rection term that is "used to weight against vector orientation misalignment." The value referred to as [gamma] is added only "[i]f [SYMBOL OMITTED] is [*33] antiparallel to [SYMBOL OMITTED]." Id. at 556. It thus appears that Burr's shape-matching algorithm is designed to remove the effects of diametric variations in stroke direction. That would make sense if the objective is only to compare the resultant shapes. If that is indeed the case, then Burr merely captures data regarding stroke direction, and not only fails to distinguish symbols on the basis of stroke direction, but expressly teaches away from that limitation by "correct[ing]" for "vector orientation misalignment."

Similar conclusions may be drawn from the Nagayama application. Although Nagayama describes "a coordinates signal generator [that] generates signals corresponding to the coordinates of the points being pressed by the pen," its discussion on symbol distinction is limited to "compar[ing] the pattern of the character stored in the image memory . . . with the reference standard patterns in the dictionary." See Nagayama at 4. In this manner, Nagayama appears to disclose only the capture of directional data and subsequent shape matching; it is not clear that it distinguishes symbols based on both geometric shape and stroke direction, or "essentially only [*34] on the basis of . . . stroke direction." n1

n1 As for 3Com's Graffiti system, the geometrically identical symbols for "space" and "backspace" and for the letter "U" and one variant of the letter "V" indicate that directional data is employed in distinguishing among symbols, as shape matching of those two pairs of symbols would not by itself disclose any distinction between them.

Consequently, a genuine issue of material fact remains as to whether the Burr and Nagayama references disclose the various "stroke direction" limitations of the asserted claims of the '656 patent. Because [HN1] "invalidity by anticipation requires that the four corners of a single, prior art document describe every element of the claimed invention," *Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1282 (Fed. Cir. 2000), we vacate the district court's grant of summary judgment of invalidity for anticipation and remand the case to the district court for further proceedings with particular focus on whether Burr or Nagayama discloses the use of stroke direction in distinguishing symbols as that term is used in the patent.

B. Obviousness in Light of Nagayama and Organek
[*35]

The district court held that dependent claims 14 and 15 would have been obvious in light of Nagayama and Organek. In particular, the court held that it would have been obvious "to one skilled in the art of handwriting recognition to combine the teachings of Organek with Nagayama to utilize the known features of both in assigning a control function to a single-stroke symbol." Xerox's arguments on obviousness rely entirely on its assertion that Nagayama "lacks both [the] 'text entry' and 'stroke direction'" limitations. We have rejected Xerox's argument that Nagayama fails to disclose text entry. However, in light of our conclusions with respect to the stroke direction limitation, we cannot sustain the district court's judgment on the ground invoked by the court. Accordingly, we remand to the district court to reconsider its judgment as to obviousness based on our analysis of the stroke direction limitation and to determine, in light of its reconsideration of the stroke direction issue, whether the invention of claims 14 and 15 would have been obvious in light of Nagayama and Organek.

C. Indefiniteness or Anticipation of Claims 9 and 11

Addressing the issue of the indefiniteness [*36] of dependent claims 9 and 11, the district court concluded that the term "sloppiness space" is ambiguous and is not adequately defined in the patent. The district court observed that "the patent does not explain how one would determine whether or not symbols are sufficiently distinct so as to be well separated in sloppiness space." Yet, as Xerox asserts, the specification explicitly defines symbols that are "well separated from each other in sloppiness space" as those distinguished by "substantial angular offset (e.g., at least 45 degrees and preferably 90 degrees) or directional distinction (opposing directions)." See '656 patent, col. 3, ll. 28-31. The specification also contrasts symbols that are well separated from each other in sloppiness space from the characters of the ordinary Roman alphabets, "which are not reliably distinguishable from each other in the face of rapid or otherwise sloppy writing." '656 patent, col. 1, ll. 54-56. While those descriptions are not rigorously precise, they provide adequate guidance as to the types of symbols that are "well separated from each other in sloppiness space," particularly in light of the difficulty of articulating a more exact standard [*37] for the concept. See *In re Marosi*, 710 F.2d 799, 803 (Fed. Cir. 1983) (finding [HN2] claims not indefinite when specification provided "a general guideline and examples sufficient to enable a person of ordinary skill in the art to determine whether" claim limitation is satisfied). Thus, in light of the criteria provided in the specification, we hold that claims 9 and 11 are "subject to construction" and are not "insolubly ambiguous." For that reason, those claims are not invalid for indefiniteness. See *Bancorp Servs., L.L.C. v. Hartford Life Ins. Co.*, 359 F.3d 1367, 1371 (Fed. Cir. 2004)

(holding that [HN3] a claim will not be held invalid if the "meaning of the claim is discernible, even though the task may be formidable and the conclusion may be one over which reasonable persons will disagree"). We therefore reverse the district court's grant of summary judgment that claims 9 and 11 are invalid for indefiniteness.

In the alternative, the district court found that "[e]ven if claims 9 and 11 are not invalid as indefinite, . . . those claims are anticipated by Burr." The district court explained that "Burr teaches the use of symbols that are well defined [*38] in terms of sloppiness space." The court, however, did not explain how it interpreted the term "sloppiness space." To be sure, that is not surprising, considering that the court in its indefiniteness ruling had just found that term insolubly ambiguous. As a consequence, however, the district court's analysis provides little insight into how Burr discloses the limitation of sloppiness separation, other than to suggest that if the Graffiti symbols are well separated in sloppiness space then the Burr symbols must be as well. n2 Moreover, and more importantly, claims 9 and 11 incorporate the stroke direction limitations from claims 2-6 and 10. Accordingly, claims 9 and 11 cannot be held invalid for anticipation if the stroke direction limitations in those claims are not anticipated by Burr. We therefore vacate the portion of the district court's judgment holding, in the alternative, that claims 9 and 11 are invalid for anticipation.

n2 The district court's analysis seems to be predicated in part on its belief that this court ruled in *Xerox II* that Graffiti infringes claims 9 and 11 of the '656 patent. In dueling footnotes, the parties debate whether this court resolved that issue in *Xerox II*. In the proceedings leading to *Xerox II*, the district court characterized Xerox's argument as being that "every Graffiti symbol practices every limitation of the independent claims [claims 1, 10, 12, and 16] of the '656 patent." The district court did not address the issue of infringement of the dependent claims at that time, and the parties did not present the infringement issue on a claim-by-claim basis in *Xerox II*. We therefore did not address the question whether the Graffiti system infringed the dependent claims. Accordingly, to the extent that it may be relevant to future proceedings in this case, we hold that the previous adjudication upholding the district court's summary judgment of infringement did not extend to dependent claims 9 and 11.

[*39]

III

2006 U.S. App. LEXIS 14050, *

In summary, while we agree with the district court's analysis in many respects, we disagree with the court with regard to the "stroke direction" limitation, and we disagree with the court's indefiniteness and anticipation analysis as applied to claims 9 and 11. Our determination with respect to the stroke direction limitation requires that we vacate the judgment and remand for further consideration of both the anticipation and obviousness rul-

ings. Our determination with respect to the court's indefiniteness analysis requires that we reverse the judgment that claims 9 and 11 are invalid on that ground.

Each party shall bear its own costs for this appeal.

REVERSED IN PART, VACATED IN PART, and REMANDED.

1 of 100 DOCUMENTS

IN RE HSIAO-DONG CHIANG

94-1144

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

1994 U.S. App. LEXIS 33214

November 23, 1994, Decided

NOTICE: [*1] NOTE: Pursuant to Fed. Cir. R. 47.6, this disposition is not citable as precedent. It is a public record. The disposition will appear in tables published periodically.

SUBSEQUENT HISTORY: Reported in Table Case Format at: *41 F.3d 1521, 1994 U.S. App. LEXIS 38824.*

PRIOR HISTORY: Appeal from the Board of Patent Appeals and Interferences. Serial No. 07/519,613.

DISPOSITION: Reversed

CASE SUMMARY:

PROCEDURAL POSTURE: Appellant sought review of a ruling from the Board of Patent Appeals and Interferences (board), which rejected claims 2 and 4 of appellant's application under *35 U.S.C.S. § 102* in an action involving a patent.

OVERVIEW: Appellant filed an application under § 102 for a claimed invention relating to electrical power disturbances. The board agreed with the examiner that a cited prior art anticipated claims 2 and 4, and found that the cited prior art disclosed a calculation as broadly claimed of a predetermined time as a function of on-line fault conditions. Subsequently, the board rejected claims 2 and 4. On review, appellant claimed that the cited prior art did not disclose a way to calculate a restart time based on the nature of the interruption. The court reversed, finding that the board clearly erred in finding that the cited prior art disclosed appellant's system. Because the cited prior art used programming to reset the interval duration and its preset interval did not depend on actual fault conditions, the cited prior art failed to disclose or even suggest tailoring interval duration to a specific event disturbance. Appellant's calculating claim limitation could not reasonably be interpreted to read on a reference that did not show such a calculation. Unlike ap-

pellant's calculated interval, the cited prior art's preset interval was not a function of on-line fault conditions.

OUTCOME: The court reversed the board's decision that rejected claims 2 and 4 of appellant's application in an action involving a patent.

LexisNexis(R) Headnotes

Patent Law > Anticipation & Novelty > Elements
Patent Law > Anticipation & Novelty > Fact & Law Issues
Patent Law > Inequitable Conduct > Effect, Materiality & Scienter > General Overview

[HN1] For a prior art reference to anticipate in terms of *35 U.S.C.S. § 102*, every element of the claimed invention must be identically shown in a single reference. Anticipation is a question of fact, reviewable only for clear error. When the Board of Patent Appeals and Interferences clearly errs in finding that the prior art shows each and every claim limitation, the court must reverse.

Patent Law > Infringement Actions > Claim Interpretation > General Overview

[HN2] Pending claims must be interpreted as broadly as their terms reasonably allow.

JUDGES: Before PLAGER, LOURIE, and RADER, Circuit Judges.

OPINIONBY: RADER

OPINION:

DECISION

Hsiao-Dong Chiang filed Patent Application No. 07/519,613 for a system addressing electrical power disturbances. The Board of Patent Appeals and Interfer-

ences (Board) rejected claims 2 and 4 of Chiang's application under 35 U.S.C. § 102 (1988). In *re* Chiang, No. 93-1552 (PTO Bd. Pat. Apps. & Interferences Oct. 7, 1993). Because the Board clearly erred in finding that the cited prior art disclosed Chiang's system, this court reverses.

DISCUSSION

This appeal considers only the rejection of claims 2 and 4 as anticipated by cited prior art. Claim 2 states:

In an electrical power system having a plurality of buses and means for restoring continuity in circuits after an event disturbance has interrupted continuity thereof, an on-line detection system for assuring transient stability of the electrical power system, comprising:

(a) [*2] means for detecting on-line, an electrical power system interruption of a bus; and

(b) means for restoring continuity in said interrupted electrical power system at a predetermined time after said event disturbance has occurred, said detection system calculating said predetermined time as a function of online fault conditions.

With this language, Chiang claims a system to detect an event disturbance, like a lightning strike, that interrupts power distribution. The claimed system also restores distribution at a "predetermined time" after the event disturbance. The system "calculat[es] said predetermined time as a function of on-line fault conditions."

The examiner rejected claims 2 and 4 as anticipated by U.S. Patent No. 4,680,706 to Bray. Bray describes an improvement to a computer "recloser control." A recloser is a device that automatically interrupts excessive current flow. It also restores power distribution after the excessive current flow ends. Bray's recloser control system includes an independent memory that allows it to operate during power outages.

Bray does not disclose when to restore power distribution. Bray simply states that he restores distribution "after an interval." [*3] Bray discusses the duration of the interval between successive attempts to deactivate the recloser and restore normal distribution. However, Bray presets this interval by programming the independent memory. Even here, Bray does not tailor the duration of this interval to the nature of the event disturbance.

The Board agreed with the examiner that Bray anticipates claims 2 and 4 under 35 U.S.C. § 102(b). The

Board found, *inter alia*, that Bray discloses "a 'calculation,' as broadly claimed, of a predetermined time as a function of on-line fault conditions." Chiang appeals. Chiang contends that Bray does not disclose a way to calculate a restart time based on the nature of the interruption.

"[HN1] For a prior art reference to anticipate in terms of 35 U.S.C. § 102, every element of the claimed invention must be identically shown in a single reference." *In re Bond*, 910 F.2d 831, 832, 15 USPQ2d 1566, 1567 (Fed. Cir. 1990) (quoting *Diversitech Corp. v. Century Steps Inc.*, 850 F.2d 675, 677, 7 USPQ2d 1315, 1317 (Fed. Cir. 1988)). Anticipation [*4] is a question of fact, reviewable only for clear error. *In re Baxter Travenol Lab.*, 952 F.2d 388, 390, 21 USPQ2d 1281, 1283 (Fed. Cir. 1991). When the Board clearly errs in finding that the prior art shows each and every claim limitation, this court must reverse. See *id.*; *Bond*, 910 F.2d at 832.

Chiang claims calculation of the restart time after an event disturbance "as a function of on-line fault conditions." The claimed system determines the restart time based on actual fault conditions. Bray, on the other hand, discloses a preset restart time not tailored to the specific event disturbance.

The prosecution history affirms that Chiang's claimed calculation, properly interpreted, is an "on-line" computation based on actual fault conditions. Chiang distinguished the prior art as unable to perform such a calculation:

The ability to determine when a [power] system will become unstable as a result of a disruption in the line is a very complex problem, which, up until the present invention, could not be determined on a suitable, "on-line" basis. The mathematical analyses determining the [*5] stable condition was [sic] so complex, and required so much "number crunching," that the computers could not achieve the answer until after failure had occurred. In other words, there was no "online" system for resolving the problem.

...

The invention protects a circuit by sensing fault conditions, analyzing these conditions "on-line", and then protecting the electrical power grid by taking appropriate action, such as restoring continuity in a line

(Emphasis added.) Chiang's specification discusses assessing stability on-line by using the claimed calculation. Chiang explains that his calculation is an approximation of the more elaborate prior art calculation. A computer can perform Chiang's calculation quickly enough to protect the power system. According to Chiang, this allows his system to meet stringent reliability planning requirements, beyond the capability of the prior art.

Chiang refers to the calculated interval of claims 2 and 4 as a "predetermined time." This language does not expand the "calculating" claim limitation to read on systems using preset intervals. In the specification, Chiang provides an example comparing the results of his on-line calculation [*6] with those of the more accurate, but unworkable, prior art. Chiang observes that his calculation "offers fairly accurate direct analysis of transient stability." Chiang concludes:

Through the application of the inventive method system [sic], transient stability is assured. The inventive method provides the capability to predetermine a time to close a circuit breakers [sic] opened when the event disturbance occurred, thus clearing the fault-on condition and returning the system to a post-fault, steady state operating environment.

(Emphasis added.) Chiang thus refers to "predetermining" when to restore continuity using his on-line calculation. This accords with the recitation in claims 2 and 4 of "calculating said predetermined time as a function of on-line fault conditions." A preset time is not a "predetermined time" within the meaning of claims 2 and 4 as properly interpreted.

The Board clearly erred in holding that the "calculating" limitation of claims 2 and 4 reads on Bray's programmable interval. Bray uses programming to preset the interval duration. Bray's preset interval does not depend on actual fault conditions. Bray fails to disclose or even suggest tailoring [*7] interval duration to a specific event disturbance.

"[HN2] Pending claims must be interpreted as broadly as their terms reasonably allow." *In re Zletz*, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989). But Chiang's "calculating" claim limitation cannot reasonably be interpreted to read on a reference that does not show such a calculation. See *Bond*, 910 F.2d at 832. Unlike Chiang's calculated interval, Bray's preset interval is not "a function of on-line fault conditions." On this point, the Board committed clear error.

CONCLUSION

The cited prior art does not disclose Chiang's "calculating" claim limitation. The Board committed clear error by finding that this prior art anticipates Chiang claims 2 and 4. This court therefore reverses.